SECTION 10

POLLUTANT LOADINGS

This section presents annual pollutant loading and removal estimates for the iron and steel industry for each of the regulatory options in each subcategory. EPA estimated the pollutant loadings and removals from iron and steel sites to evaluate the effectiveness of the treatment technologies, to estimate benefits gained from removing pollutants discharged from sites, and to evaluate the cost-effectiveness of the regulatory options in reducing the pollutant loadings. EPA defined baseline and post-compliance pollutant loadings as follows:

- Baseline loadings - Pollutant loadings in iron and steel wastewater being discharged to surface water or through publicly owned treatment works (POTWs) to surface water.

- Post-compliance loadings - Estimated pollutant loadings in iron and steel wastewater after implementation of the proposed rule, also referred to as treated loadings. EPA calculated these loadings assuming that all iron and steel sites would operate wastewater treatment and pollution prevention technologies equivalent to the technology option for which they have been costed.

- Pollutant removals - The difference between baseline loadings and post-compliance loadings for each regulatory option.

EPA estimated baseline and post-compliance pollutant loadings and the expected pollutant removal for each subcategory and segment and each technology option presented in Section 8. This section discusses the methodology that EPA used to estimate pollutant loadings and presents the resultant estimated baseline and treated loadings and pollutant removals as follows:

- Section 10.1 discusses the data sources that EPA used to estimate pollutant loadings and removals;

- Section 10.2 discusses the general methodology EPA used to estimate pollutant loadings, including selecting pollutants considered for loadings estimation and baseline and treatment effectiveness concentrations; and

- Sections 10.3 through 10.9 present the methodology used to estimate pollutant loadings and the resulting pollutant reductions for each regulatory option in each subcategory; and

- Section 10.10 presents the references used in this section.

10.1 Sources and Use of Available Data

EPA used data from several sources to estimate baseline and post-compliance pollutant loadings. These sources included EPA site visits and sampling episodes at iron and steel sites, responses to the Detailed and Short Surveys and the Analytical and Production Survey, and publicly available National Pollutant Discharge Elimination System (NPDES) and pretreatment permit application data. Section 3 discusses data sources used to develop this regulation in detail.

10.1.1 Analytical Data Sources

EPA used flow rate data from the industry surveys. For pollutant concentration data, EPA used industry-provided data from the industry survey and data from EPA's wastewater sampling program. EPA received self-monitoring data with individual data points for 1997 from a select group of sites that received the Analytical and Production Survey. Other sites provided only summary self-monitoring data (a 1997 annual average). EPA used publicly available permit application data where necessary (i.e., if self-monitoring or sampling data did not sufficiently represent operating conditions).

10.1.2 Calculation of Averages from Analytical Data

For each site and pollutant of concern (POC) in the loadings analysis, EPA calculated an average baseline pollutant concentration and an arithmetic long-term average (LTA) concentration, discussed below. For the average baseline concentrations the Agency did not edit the analytical data from EPA sampling episodes, self-monitoring data, or permit application data prior to calculating averages. For the arithmetic LTA, EPA edited data as described in Section 12.

Baseline Analytical Data

To calculate baseline concentrations, if a site provided both individual and summary data for the same pollutant, the Agency used the individual data points instead of the summary data. If a site had sampling data in addition to self-monitoring data for the same pollutant, EPA first averaged the sampling data and self-monitoring data and then averaged the resulting averages. When combining sampling and self-monitoring data averages, EPA did not eliminate any sampling data or self-monitoring data prior to averaging them, even if they were duplicate samples (from the same day and sampling point). If only sampling data were available, EPA averaged the results from the sampling trip. EPA used permit application data if no other data were available.

When sites provided self-monitoring individual data points for 1997, the Agency calculated an arithmetic average of all the data. When sites provided industry self-monitoring summary data (where results were already averaged), the Agency used those numbers. For permit application data, sites monitored multiple times for some pollutants but only one time for other pollutants.

Depending on the data source, the Agency treated pollutant data below the sample detection limit differently. With EPA sampling data, when concentrations were below the sample detection limit, EPA used the reported sample detection limit as the concentration for that pollutant. With individual self-monitoring data, when concentrations were below the sample detection limit, the Agency used what the site reported as the sample detection limit. When sites provided summary data, EPA used the concentrations that the sites submitted, which could have been calculated by any method. Of those sites that submitted summary data, 26 percent used the method detection limit as the concentration for that pollutant; 26 percent used the sample detection limit; 7 percent used one-half the method detection limit; 3 percent used one-half the sample detection limit; and 38 percent used zero. Using zero as the concentration for the pollutant estimated the minimum amount of the pollutant, and using the method or sample detection limit estimated the maximum amount.

Arithmetic LTA Analytical Data

For model effluent pollutant concentrations, EPA calculated 1997 arithmetic LTAs from the same datasets used to calculate the LTAs and variability factors in Section 12. If concentrations of pollutants were below the sample detection limit, EPA used the sample detection limit. The Agency used multiple sites' data for some options. In these cases, EPA first averaged the data for each site, and then averaged the sites averages with each other. EPA edited the data model effluent data sets as discussed in Section 12.

10.2 <u>Methodology</u>

EPA estimated pollutant loadings for all the sites in each subcategory, based on the analytical data and flow rates obtained by EPA using the following equation:

$$\text{Load} = \text{Flow} \times \text{Conc} \times 8.345(10^{-6}) \; \frac{\text{lbs}}{\text{gal} \cdot (\text{mg/L})} \times \text{SW} \tag{10-1}$$

where:

Load	=	Pollutant loading, lbs/yr
Flow	=	Flow rate, gal/yr
Conc	=	Pollutant concentration, mg/L
$8.345(10^{-6})$	=	Conversion factor, lbs/gal and mg/L
SW	=	Survey weight, available in Appendix A of this document.

From the industry surveys, EPA determined which subcategories and segments apply to each site based on the manufacturing operations in place. EPA then estimated pollutant loadings for the entire industry based on the survey weights developed for each facility. For *baseline loadings*, EPA used site-specific analytical and flow data representing each site's treatment in place, as discussed below in 10.2.1. For *treated loadings*, EPA used the data obtained for the treatment options, as discussed below in 10.2.2.

For each site, EPA determined which manufacturing operations in each subcategory and segment generated wastewater and calculated pollutant loadings for each operation. For example, for integrated steelmaking, one site could have one basic oxygen furnace (BOF) and two continuous casting lines. In this case, EPA calculated the flow rate and pollutant concentration for the BOF and casting lines separately and then summed them to calculate the pollutant loading for the site and subcategory.

EPA estimated pollutant loadings for a subset of the POCs identified in Section 7. From the list of POCs, EPA eliminated pollutants that were never found at concentrations above the detection limit in the effluent for any site, by subcategory and segment. EPA used data from the EPA sampling program and self-monitoring data; however, for many POCs (particularly organic compounds), the only available data were from the EPA sampling program.

If a POC was not detected in the baseline effluent at any site, EPA excluded it from the loadings analysis. Table 10-1 lists the pollutants that were never detected in the effluent at any site for each subcategory and segment. Because these pollutants were detected in the untreated wastewater at multiple sites and passed all POC criteria, they remain POCs. While the effluent data reflect current wastewater technology in place, POC criteria were developed with raw wastewater data from EPA's sampling program and associated criteria for source water screening (see Section 7). Because most sites have some technology in place, the baseline effluent data are different from the data used for POC selection.

EPA estimated both baseline and treated pollutant loadings for the iron and steel industry for the base year 1997. The Agency included sites (or operations) that operated during the 1997 calendar year in the cost and loadings analyses, using the following criteria:

- If a site operated at least one day during the 1997 calendar year; and

- If a site (or operation) shut down after 1997.

If a site (or operation) commenced after 1997, EPA did not include the site (or operation).

For some sites, 1997 data did not represent normal operating conditions, and alternate years' data were used according to the sites' choice of representative time. EPA was aware that several sites had operated only part of 1997 because of strikes, shut-downs, or start-ups. For these sites, EPA used production, analytical, and flow rate data from years that the sites indicated were representative of normal operations. If sites installed or significantly altered wastewater treatment systems either during or after 1997, EPA used the data that represented their current wastewater treatment configuration.

EPA was aware of a unique case in which a site's self-monitoring data from 1997 conflicted with self-monitoring data from 1996 by an order of magnitude. EPA contacted the site and, at their direction, used three years of analytical data to better represent the treatment system performance.

Some sites co-treat their wastewater from multiple subcategories, as discussed in Section 9. EPA evaluated entire co-treatment systems to determine what treatment improvements were necessary. For pollutant loadings, EPA had sufficient flow rate and analytical data to calculate loadings and reductions for co-treated wastewaters by subcategory. However, the Agency allocated four sites that co-treat their ironmaking, steelmaking, and/or hot forming wastewaters flow reductions that were not standard for that subcategory, and considered them individually. For these sites, EPA assessed flow reductions for the entire co-treatment system, not just for one subcategory, and determined the flow reduction attainable by each co-treatment system on a case-by-case basis. The Agency then allocated pollutant loadings across subcategories, based on the percentage of the co-treated flow generated by the manufacturing operations.

For indirect discharging options, EPA accounted for treatment at the POTW using the following equation:

$$\text{Load} = (1 - \text{POTW \% Removal}) * (\text{Original Load}) \tag{10-2}$$

where:

Original load	=	Pollutant loading from Equation 10-1, in lbs/yr
POTW percent removal	=	Mass-based percent removal, shown in Table 10-2.

The POTW percent removal values are based on data from the Fate of Priority Pollutants in Publicly Owned Treatment Works and National Risk Management Research Laboratory (NRMRL) Treatability Database and are discussed in Section 11 (References 10-1 and 10-2). The baseline and post-compliance pollutant loadings and associated removals for indirect dischargers presented in this section represent removals of pollutants being discharged from POTWs using the above equation.

10.2.1 Baseline Pollutant Loading Calculation

EPA used flow rate and analytical data from each site's industry survey to estimate the baseline loading, site by site and pollutant by pollutant, using Equation 10-3:

$$\text{Site Baseline Load} = \text{Flow} \times \text{Baseline Conc} \times 8.345(10^{-6}) \ \frac{\text{lbs}}{\text{gal} \cdot (\text{mg/L})} \tag{10-3}$$

where:

Site Baseline Load	=	Baseline pollutant load discharged to surface water by a site, in lbs/yr
Site Flow	=	Subcategory-specific process wastewater flow for site, reported in survey, gallons per year
Baseline Conc	=	Site baseline concentration, mg/L
$8.345(10^{-6})$	=	Conversion factor, lbs/gal and mg/L.

In the industry survey, all sites reported flow rates and most sites reported baseline concentration data. Sites reported flow from operations in either gallons per minute or gallons per day, along with the corresponding days per year and hours per day, as necessary. EPA used the flows as reported by the sites. For pollutant concentrations, EPA used the analytical data included with the survey outfall data.

Sites tend to monitor pollutants listed in their permits, and therefore did not monitor all the POCs for which pollutant loads were calculated. For pollutants where site-specific data were not available, EPA transferred data from sites with similar operations and treatment in place. EPA calculated an average baseline concentration for each pollutant in a subcategory to use as a data transfer. Where appropriate, EPA calculated an average baseline concentration for each type of site (e.g., those with biological treatment, metals precipitation, oil skimming). In some cases, EPA calculated an average baseline concentration by discharge type. EPA excluded the analytical data from sites selected as the model treatment sites from the average baseline calculation. Data transfers for each subcategory are discussed later in this section.

For some pollutant parameters, EPA performed a logic check to ensure that average concentrations of pollutants derived from different datasets or data transfers did not violate certain rules. For example, many sites had self-monitoring data for oil and grease (measured as hexane extractable material), or O&G; however, they did not for total petroleum hydrocarbons (measured as silica gel treated hexane extractable material), or TPH. EPA transferred average TPH data to fill the gap. In some cases, the data transfer concentration for TPH was greater than the self-monitoring concentration for O&G, which would be unnatural because TPH is a subset of O&G. In these cases, EPA used the self-monitoring concentration for O&G as the concentration for TPH. The logic checks for data for each site included the following rules:

- Phenol could not have a concentration higher than total phenols;
- Amenable cyanide or weak acid dissociable (WAD) cyanide could not have a concentration higher than total cyanide;
- TPH could not have a concentration higher than O&G; and
- Hexavalent chromium could not have a concentration higher than total chromium.

If a rule was violated, EPA would adjust one concentration, always deferring to the site data. EPA encountered the following data conflicts, and resolved them as shown below.

Conflict	EPA Action
The self-monitoring concentration for a bulk parameter is less than the data transfer concentration for a pollutant within the bulk parameter.	Use the self-monitoring concentration as the baseline concentration for both the bulk parameter and the specific pollutant.
The self-monitoring concentration for a pollutant within a group is greater than the data transfer concentration for a bulk parameter.	Use the self-monitoring concentration as the baseline concentration for both the specific pollutant and the bulk parameter.
From the EPA sampling data, the site concentration for total recoverable phenols is less than the site concentration for phenol (no self-monitoring data are available for either pollutant).	The method for phenol is a gas chromatograph/mass spectrometry (GC/MS) method. The method for total recoverable phenols is a colorimetric method (Reference 10-1). The GC/MS is expected to be more accurate than colorimetric; therefore, use the concentration of phenol for both analyses.

For each subcategory and segment, EPA multiplied the pollutant load for each site by the survey weight and estimated the baseline load for each subcategory and segment using the following equation:

$$\text{Baseline Load} = \sum (\text{Site Baseline Load} \times \text{SW}) \qquad (10\text{-}4)$$

where:

Baseline Load	=	Industry baseline pollutant loading for each subcategory, lbs/yr
Site Baseline Load	=	Baseline load as calculated for each site in Equation 10-3, lbs/yr
SW	=	Survey weight, available in Appendix A of this document.

For indirect dischargers, the site's baseline load was adjusted by the POTW percent removal, according to Equation 10-2.

10.2.2 Treated Pollutant Loading Calculation

EPA estimated treated pollutant loadings using model PNFs and arithmetic LTAs representing each option. For each option, EPA selected the model PNF, as discussed in Section 7. For each option, EPA used the methodology for selecting sites, as discussed in Section 9. Model effluent pollutant concentrations were then calculated from the model site(s) data, as discussed in Section 10.1.2.

Section 9 explains how EPA evaluated whether a site performed as well or better than the model treatment technology for an option. EPA based the calculation of treated loadings on the costing decisions presented in Section 9. If a site performed as well or better than the model site(s), pollutant loadings remained unchanged and no pollutant removals were calculated. If the site did not perform as well as the model site(s), EPA estimated a treated load for the site, based on the reduced PNF and/or upgrade to technology in place.

To improve wastewater treatment, EPA allocated costs to sites for the following scenarios: 1) install or improve wastewater treatment to reduce effluent pollutant concentrations, 2) reduce wastewater flow rates through recycling or in-process controls, or 3) improve wastewater treatment and reduce flow rates. Section 9 discusses decisions on wastewater treatment costs. These decisions directly affected EPA's estimates of treated pollutant loadings. In scenario 1, EPA allocated costs to sites to improve wastewater treatment and set treated pollutant concentrations equal to the option arithmetic LTAs. In scenario 2, EPA allocated costs to sites to reduce wastewater flow rates and set treated flow rates equal to model PNFs. In scenario 3, both pollutant concentrations and flow rates were set equal to the model concentrations and PNFs, respectively.

In some cases with scenario 1, a site's baseline concentration for one pollutant was lower than the arithmetic LTA, but the rest of its pollutant concentrations were higher. In these cases, EPA allocated costs to the site for the necessary treatment technology, and if a site's baseline concentration for a particular pollutant was less than the model concentration or flow rate, EPA deferred to the lower number to calculate the treated load for that pollutant.

When estimating pollutant load reductions associated with model treatment technologies incorporating high-rate recycle (scenario 2), EPA used the following conventions:

(1) For pollutants that are removed or treated in the main recycle loop (e.g., total suspended solids (TSS), O&G, metals in particulate form),the concentrations discharged in the blowdown flow were held constant. The pollutant load reduction was assumed to be proportional to the reduction in flow.

(2) For pollutants that are not removed through a treatment mechanism in the main recycle loop (e.g., ammonia-N in blast furnace recycle systems, dissolved substances), the mass loadings of those pollutants discharged from the main recycle loop were held constant and the concentrations in the reduced blowdown flow were assumed to increase in direct proportion to the decrease in blowdown flow.

The Agency believes this approach is somewhat conservative because it did not account for incidental removals of certain pollutants such as ammonia-N associated with increased recycle.

EPA estimated treated pollutant loadings for each subcategory using the following equation:

$$\text{Treated Load} = \text{PNF} \times \text{PROD} \times \text{DPY} \times \text{CONC} \times 8.345(10^{-6})\frac{\text{lbs}}{\text{gal} \cdot \text{mg/L}} \tag{10-5}$$

where:

Treated Load	=	Treated pollutant loading discharged to surface water by a site, lbs/yr
PNF	=	Model production normalized flow (PNF), gpt
PROD	=	Average production during 1997[1], tons/day
DPY	=	Number of days of operation in 1997[1], days/yr
CONC	=	Option arithmetic LTA, mg/L
$8.345(10^{-6})$	=	Conversion factor, lbs/gal and mg/L.

For treated pollutant loadings for each option considered, EPA used arithmetic LTAs and model PNFs represented by the model treatment technology. For model treatment system effluent concentrations, EPA used the arithmetic averages discussed in Section 10.1.2. For model PNFs, EPA used the PNFs presented in Section 7. EPA calculated an annual flow based on the PNF (either model PNF or the site PNF, depending on which was lower) and production. EPA used the annual production and days per year reported in the industry survey for 1997[1].

For each technology option considered, EPA could only calculate a pollutant reduction for those POCs that were treated by the option. If the available monitoring data for an option did not demonstrate removal of a POC, then EPA did not calculate a reduction for that POC. For example, treatment technologies in some subcategories were not designed to remove fluoride. For a site that was allocated a flow reduction, filtration, and a cooling tower, EPA did not calculate removal of fluoride. Instead, EPA used the site's baseline loading for fluoride as the post-compliance loading. Subcategory-specific examples are presented later in this section.

After determining a site's treated load, EPA multiplied the site load by the industry survey weight and estimated the treated load for each subcategory using the following equation:

$$\text{Treated Load} = \sum (\text{Site Treated Load} \times \text{SW}) \tag{10-6}$$

where:

Treated Load	=	Industry-treated pollutant loading for each subcategory, lbs/yr
Site Treated Load	=	Treated load as calculated for each site in Equation 10-5, lbs/yr
SW	=	Survey weight, available in Appendix A of this document.

[1]For some facilities, 1997 production data did not represent normal operating conditions, and alternate years' data were used, as discussed in Section 10.2.

The site's treated load was adjusted by the POTW percent removal for indirect dischargers, according to Equation 10-2.

10.3 Pollutant Loadings for the Cokemaking Subcategory

EPA estimated the pollutant loadings for 22 by-product cokemaking sites: 14 direct dischargers and eight indirect dischargers. One by-product cokemaking site did not discharge wastewater. Sites with non-recovery cokemaking operations are zero discharge sites; therefore, EPA did not calculate pollutant loadings or removals for these sites. EPA estimated pollutant loadings for 41 of the 71 POCs, because the other POCs were not detected in baseline effluent.

10.3.1 Baseline Pollutant Loadings

EPA estimated baseline loadings for cokemaking using the flow rates reported in the industry survey and used available site data (self-monitoring, sampling, or permit application data) for the baseline concentrations. All 22 sites in the pollutant loadings analysis had baseline concentration data for ammonia-N. Most sites also monitored for benzo(a)pyrene, biochemical oxygen demand (BOD), total cyanide, total recoverable phenolics, and total suspended solids (TSS). Several sites monitored for arsenic, benzene, and naphthalene. For all POCs other than ammonia, EPA used average baseline pollutant concentrations to fill data gaps.

To estimate average pollutant concentrations, EPA examined technology in place: 13 of the 14 direct dischargers had ammonia stills and biological treatment in place, and one site had an ammonia still followed by physical/chemical treatment (dephenolizer, sand filter, and clarifier). All of the eight indirect dischargers had ammonia stills, but three also had biological treatment. EPA calculated an average baseline pollutant concentration for two types of sites: those with ammonia stills and biological treatment in place and those with just ammonia stills. For many pollutants, particularly many of the priority organic constituents, the only data available were from EPA sampling episodes.

For sites with just ammonia still treatment, EPA averaged ammonia still effluent data from sampling episodes at four cokemaking plants for the average baseline concentration. For sites with ammonia stills and biological treatment, EPA averaged available data, including self-monitoring data for some pollutants and biological treatment effluent sampling data from three cokemaking plants for all pollutants. (The fourth plant with sampling data was selected as one of two model sites, and its sampling and self-monitoring data were excluded from average data calculations). Table 10-3 presents the average baseline pollutant concentrations for both types of sites used for the 39 POCs with calculated loads.

The direct discharger with physical/chemical treatment in place provided summary data for ammonia-N, benzene, benzo(a)pyrene, naphthalene, total cyanide, total recoverable phenols, and total suspended solids. The concentrations of these pollutants were similar or higher than the average concentrations of poorly performing biological treatment sites. For the remainder of the pollutants, EPA used the data from sites with biological treatment in place because of limited available data.

The wastewater treatment systems at four direct discharging sites have treatment technology in place similar to the BAT-1 model sites (see Section 8 for discussion of the regulatory options). These four sites recently upgraded their biological treatment, but no data were available for the newly enhanced treatment systems. Based on the recent treatment enhancements, EPA assumed the treatment technologies at these sites would perform as well as the BAT model technology. For these sites, EPA did not take credit for any removals as a result of the proposed regulation.

Using the site baseline concentrations and flow rates in Equations 10-3 and 10-4, EPA calculated pollutant loadings for the Cokemaking Subcategory. For indirect dischargers, EPA adjusted the pollutant loadings using POTW percent removals and Equation 10-2.

10.3.2 Treated Pollutant Loadings

EPA estimated treated pollutant loadings for the Cokemaking Subcategory using the model PNFs and arithmetic LTAs. Loads were estimated for the options presented in Section 8. EPA estimated loading reductions based on the results of the costing analysis in Section 9, for the four BAT model technologies listed in the table below.

BAT Technology Options for By-Product Recovery Cokemaking Segment

Treatment Unit	BAT-1	BAT-2	BAT-3	BAT-4
Tar/oil removal	✔	✔	✔	✔
Equalization/ammonia still feed tank	✔	✔	✔	✔
Free and fixed ammonia still	✔	✔	✔	✔
Temperature control	✔	✔	✔	✔
Cyanide precipitation with sludge dewatering		✔		
Equalization tank	✔	✔	✔	✔
Biological treatment with secondary clarification	✔	✔	✔	✔
Sludge dewatering	✔	✔	✔	✔
Alkaline chlorination (2-stage)			✔	✔
Mixed-media filtration				✔
Granular activated carbon				✔

EPA used the arithmetic LTAs for BAT-1 to estimate treated pollutant loadings. For most pollutants, the treated pollutant loadings for BAT-2, BAT-3, and BAT-4 are the same as BAT-1 because the model technologies are equivalent to BAT-1 with add-on technologies. For example, BAT-2 is equivalent to BAT-1 with the addition of cyanide precipitation. EPA used the arithmetic LTA of the BAT-2 site for total cyanide and used the BAT-1 arithmetic LTA for the remaining POCs. EPA followed this same procedure for all the options. For BAT-3, EPA used the model arithmetic LTA for total cyanide, ammonia-N, and total recoverable phenols from the BAT-3 model site and used BAT-1 LTAs for all the other POCs. For BAT-4, EPA used the model arithmetic LTAs for mercury and TSS and used BAT-3 LTAs for all other POCs. Table 10-4 lists the arithmetic LTAs used to calculate load for all options for this subcategory.

PSES options for by-product cokemaking are structured similarly to the BAT options. Options were add-on technologies to PSES-1, as shown in the table below.

PSES Technology Options for By-Product Recovery Cokemaking Segment

Treatment Unit	PSES-1	PSES-2	PSES-3	PSES-4
Tar/oil removal	✔	✔	✔	✔
Equalization/ammonia still feed tank	✔	✔	✔	✔
Free and fixed ammonia still	✔	✔	✔	✔
Temperature control			✔	✔
Cyanide precipitation with sludge dewatering		✔		
Equalization tank			✔	✔
Biological treatment with secondary clarification			✔	✔
Sludge dewatering			✔	✔
Alkaline chlorination (2-stage)				✔
Multimedia filtration		✔		

The PSES-3 and PSES-4 options are equivalent to BAT-1 and BAT-3, respectively. For PSES-1 and PSES-2, the data from the model sites demonstrated removal of only the following POCs considered for regulation, though many others are treated.

Option	POCs Treated By the Option
PSES-1	Ammonia-N
	Chemical oxygen demand (COD)
	Total cyanide
PSES-2	Ammonia-N
	Chemical oxygen demand (COD)
	Total cyanide
	Total suspended solids (TSS)

In cases where EPA's data indicates that a POC was not treated by the option, EPA used the site's baseline concentration. Table 10-4 presents the arithmetic LTAs used to calculate loads for all technology options for cokemaking.

EPA used the model PNFs presented in Section 7 for post-compliance flow rates, when sites were identified as above the regulatory PNF. EPA calculated a flow reduction for sites identified in Section 9 as receiving flow reductions. The Agency estimated flow reductions for three direct discharging sites: two for reduced control water volume and one for reduced steam volume at the ammonia still. (EPA assumed the reduced steam volume based on the installation of biological treatment at the site, which would allow for a higher ammonia still effluent concentration from the still and less steam use). For indirect dischargers, EPA did not estimate any flow reductions. The flow reduction for direct dischargers was 1.6 million gallons for the year, a 5 percent reduction.

EPA estimated that the three sites with flow reductions would still achieve the model LTAs. For the two sites with control water flow reductions, EPA determined that the sites would also require enhanced biological treatment, as discussed in Section 9. These sites are expected to meet the arithmetic LTA even with flow reductions, because their treatment configuration would resemble the model sites. The model sites achieve the arithmetic LTAs using control water at volumes equal to or less than the regulatory control water volume.

Similarly, the site with a reduced flow from ammonia still steam is expected to meet the arithmetic LTA. EPA allocated this site costs to install an entire biological treatment system that would resemble the model sites, as discussed in Section 9.

For four sites, EPA used the arithmetic LTAs as the sites' baseline concentrations, based on recent treatment system enhancements. These sites did not require flow reductions or treatment to lower effluent pollutant concentrations at BAT-1. At BAT-2, BAT-3, and BAT-4, these sites were allocated costs for improved treatment to lower pollutant effluent concentrations.

Using the model arithmetic LTAs and PNFs in Equations 10-5 and 10-6, EPA calculated treated pollutant loadings for the Cokemaking Subcategory. For indirect dischargers, EPA adjusted the pollutant loadings using POTW percent removals and Equation 10-2. Pollutant removals were calculated as the difference between the treated and baseline loadings.

The following tables summarize the baseline and post-compliance pollutant loadings and associated removals for the By-Product Recovery Cokemaking Segment:

- Table 10-5 - Presents the baseline and post-compliance pollutant loadings, in lbs/yr, for all options for direct dischargers;

- Table 10-6 - Presents the baseline and post-compliance pollutant loadings, in lbs/yr, for all options for indirect dischargers;

- Table 10-7 - Presents the pollutant removals, in lbs/yr, for all options for direct dischargers; and

- Table 10-8 - Presents the pollutant removals, in lbs/yr, for all options for indirect dischargers.

10.4 Pollutant Loadings for the Ironmaking Subcategory

EPA estimated loadings for the 15 ironmaking sites that generate and discharge process wastewater. The remaining sites are zero dischargers, because they use dry air pollution control, they use their wastewater to slag quench, or both. One of the sites that discharges its wastewater to slag quench was allocated costs to treat dioxins/furans but was not included in the loadings analysis. In 1997, this site was a zero discharger, but to comply with the proposed regulation, it would have a small, intermittent discharge stream. For wastewater streams from blast furnace operations, EPA estimated pollutant loadings for 25 of the 27 POCs. For those from sintering operations, EPA estimated pollutant loadings for 43 of the 65 POCs.

10.4.1 Baseline Pollutant Loadings

EPA estimated baseline concentrations using the flow rates reported in the industry survey and used available site data (self-monitoring, sampling, or permit application data) for baseline concentrations. Fourteen of the 15 sites had baseline concentration data (self-monitoring, sampling, or permit application data) for lead, total cyanide, total phenols, TSS, and zinc. Thirteen had baseline concentration data for ammonia-N, and three had data for iron. One site with blast furnace wastewaters did not provide monitoring data, and EPA had no sampling data for that site. EPA used average baseline concentrations to fill data gaps for all POCs that sites did not monitor.

For sintering, EPA used primarily sampling data to fill data gaps. Sampling data were available for one site with sintering operations. EPA used the average POC concentrations of the sampling data as the average baseline concentration for sintering wastewaters.

For blast furnace ironmaking, EPA also used primarily sampling data to fill data gaps. Sampling data were available for two sites. One of the sites is located in Canada, and EPA used the data from this site to estimate average pollutant concentrations because the data are representative of blast furnace ironmaking wastewaters. EPA excluded the Canadian site from the remainder of the loadings analysis because it is outside the scope of this proposed U.S. regulation.

For both direct and indirect dischargers with blast furnace wastewaters, EPA used sampling data from the two sites for the average baseline concentration. Section 10.1.2 describes how EPA calculated the average. Tables 10-9 and 10-10 present sintering and blast furnace average baseline pollutant concentrations, respectively, used for POCs with calculated loads.

The wastewater treatment systems at one direct discharging site has treatment technology in place similar to the BAT-1 arithmetic LTAs, but does not have high-rate recycle in place. The site recently upgraded treatment for blast furnace wastewaters, but no data were available for this treatment system. Based on the treatment in place, EPA used the baseline data from sites representing model treatment for BAT-1 to estimate the pollutant loadings for this site. The site was still allocated flow reduction technology.

10.4.2 Treated Pollutant Loadings

EPA estimated treated pollutant loadings for the Ironmaking Subcategory using the model PNFs and arithmetic LTAs. Loadings reductions were based on the results of the costing analysis in Section 9. EPA estimated loads for the options presented in Section 8, as summarized in the table below:

Technology Options for Ironmaking Subcategory

Treatment Unit	**BAT-1**	**PSES-1**
Clarifier	✔	✔
Sludge dewatering	✔	✔
Cooling tower (blast furnace only)	✔	✔
High-rate recycle	✔	✔
Blowdown treatment		
Metals precipitation	✔	✔
Alkaline chlorination (2-stage)	✔	
Multimedia filtration	✔	

The model site selected to represent the option technology provided analytical data for ammonia-N, total cyanide, and phenol. For the arithmetic LTAs for the remaining POCs, EPA selected a site that had all other treatment units in place except alkaline chlorination (clarifier, cooling tower, high-rate recycle, metals precipitation, and multimedia filtration). For PSES-1, EPA selected one site to represent the model effluent treatment technology. For the 12 sites with Clean Water Act 301(g) variances for ammonia and phenol discussed in Section 9, EPA used the sites' baseline concentration for these two pollutants to calculate treated loadings. Tables 10-11 and 10-12 present the arithmetic LTAs used to calculate loads for all technology options considered.

The one site that did not provide monitoring data was allocated a flow reduction, but not treatment upgrades because it had sufficient treatment technology in place. EPA used data from the site representing the option for baseline concentrations. These same pollutant concentrations were used to calculate the treated loading but with the lower regulatory PNF.

EPA used the model PNFs presented in Section 7 for post-compliance flow rates but only for sites that were allocated flow reductions in the costing analysis. EPA assessed flow reductions for four direct dischargers with co-treatment systems for ironmaking, steelmaking, and/or hot forming wastewaters based on the flow reduction for the entire co-treatment system and the percentage of the co-treated flow generated by the manufacturing operations. Overall flow reduction was 6 percent.

The following tables summarize the baseline and post-compliance pollutant loadings and associated removals for the Ironmaking Subcategory:

- Table 10-13 - Presents the baseline and post-compliance pollutant loadings, in lbs/yr, for all options for direct and indirect dischargers; and

- Table 10-14 - Presents the pollutant removals, in lbs/yr, for all options for direct and indirect dischargers.

10.5 Pollutant Loadings for the Integrated Steelmaking Subcategory

EPA estimated loadings for the 21 discharging sites with integrated steelmaking operations. This subcategory includes the following operations: basic oxygen furnace (BOF) steelmaking, vacuum degassing, and continuous casting. Of the 21 discharging sites, some generate wastewater from all three operations, and some only from continuous casting. EPA considered BOF, vacuum degassing, and continuous casting wastewater streams separately for each site. EPA estimated pollutant loadings for 26 of 28 POCs for the Integrated Steelmaking Subcategory, because the other POCs were not detected in baseline effluent.

10.5.1 Baseline Pollutant Loadings

EPA estimated baseline loadings for the Integrated Steelmaking Subcategory using the flow rates reported in the industry survey and used available site data (self-monitoring, sampling, or permit application data) for the baseline concentrations. Ten of the 21 sites did not provide monitoring data, and EPA had no sampling data for these sites. The remaining 11 sites all provided self-monitoring data for lead and zinc. Several sites provided self-monitoring data for the following pollutants: aluminum, cadmium, TPH (measured as silica gel treated hexane extractable material (SGT-HEM)), and TSS. For all POCs that sites did not monitor, EPA used average baseline concentrations to fill data gaps.

EPA calculated the average baseline concentration using sampling data and self-monitoring data for the direct dischargers. Except for the pollutants listed in the above paragraph, EPA used sampling data to calculate an average baseline concentration. Sampling data were available for three sites, all with BOF, vacuum degassing, and continuous casting operations. Table 10-15 presents the average baseline pollutant concentrations used to fill data gaps for the POCs with calculated loads.

Two sites, a direct discharger and the indirect discharger, had similar treatment technology in place compared to the model site and are expected to treat pollutants to concentrations similar to the arithmetic LTAs. EPA assumed the treatment technologies at these sites would perform as well as the option technology. For these sites, EPA did not take credit for any removals as a result of the proposed regulation.

10.5.2 Treated Pollutant Loadings

EPA estimated treated pollutant loadings for integrated steelmaking sites using the model PNFs and arithmetic LTAs. Loadings reductions were based on the results of the costing analysis in Section 9. Loads were estimated for the options presented in Section 8: BAT-1 and PSES-1 (where BAT-1 = PSES-1). The table below summarizes the options.

Technology Options for Integrated Steelmaking Subcategory

Treatment Unit	BAT-1	PSES-1
Classifier (BOF only)	✔	✔
Scale pit with oil skimming (continuous casting only)	✔	✔
Clarifier	✔	✔
Sludge dewatering	✔	✔
Multimedia filtration[a] (continuous casting only)	✔	✔
Cooling tower (vacuum degassing and continuous casting)	✔	✔
High-rate recycle	✔	✔
Blowdown treatment		
Metals precipitation	✔	✔

[a] May be used in recycle circuit or as blowdown treatment.

The available data from the site selected to represent the option did not demonstrate removals of the following POCs in the loadings analysis: ammonia-N, nitrate/nitrite, and phenol. For these POCs, EPA used the site's baseline concentration for the post-compliance loading calculation. For all other POCs, the treatment train was expected to provide treatment. Table 10-16 presents the proposed arithmetic LTAs used to calculate loads for the Integrated Steelmaking Subcategory.

EPA used the model PNFs presented in Section 7 for post-compliance flow rates but only for sites that were allocated flow reductions in Section 9. Seventeen direct dischargers were allocated flow reductions. EPA assessed flow reductions for four direct dischargers with co-treatment systems for ironmaking, steelmaking, and/or hot forming wastewaters based on the flow reduction for the entire co-treatment system and the percentage of the co-treated flow generated by the manufacturing operations. The overall flow reduction was 83 percent.

The following tables summarize the baseline and post-compliance pollutant loadings and associated removals for the Integrated Steelmaking Subcategory:

- Table 10-17 - Presents the baseline and post-compliance pollutant loadings, in lbs/yr, for all options for direct and indirect dischargers; and

- Table 10-18 - Presents the pollutant removals, in lbs/yr, for all options for direct and indirect dischargers.

10.6 Pollutant Loadings for the Integrated and Stand-Alone Hot Forming Subcategory

EPA estimated loadings for the 51 carbon and alloy steel and three stainless steel sites that generate and discharge process wastewater. Loads calculations were based on data from the surveyed sites: 36 carbon and alloy steel and two stainless steel. For carbon and alloy steel sites, 32 surveyed sites discharge directly and one site discharges indirectly. For stainless steel sites, two surveyed sites discharge indirectly. EPA estimated pollutant loadings for all POCs for the Carbon and Alloy Steel Segment and all POCs for the Stainless Steel Segment.

10.6.1 Baseline Pollutant Loadings

EPA estimated baseline loadings for integrated and stand-alone hot forming sites using the flow rates reported in the industry survey and used available site data (self-monitoring, sampling, or permit application data) for the baseline concentrations. Twenty-four of the sites did not provide monitoring data, and EPA had no sampling data for these sites. Neither of the two stainless sites provided analytical data. Fourteen carbon and alloy steel sites provided self-monitoring data: one indirect discharger and 13 direct dischargers. Most of the sites monitored for TSS and COD; several monitored for iron, lead, and total recoverable phenolics. For all POCs that sites did not monitor, EPA used average baseline concentrations to fill data gaps.

EPA calculated the average baseline concentration using sampling data and self-monitoring data for the direct dischargers. Except for COD, TSS, and several metals listed in the above paragraph, EPA used sampling data to calculate an average baseline concentration. Sampling data were available for four sites: three direct discharging carbon and alloy steel sites and one direct discharging specialty site. Tables 10-19 and 10-20 present the average baseline pollutant concentrations used to fill data gaps for the POCs with calculated loads for the Carbon and Alloy Steel and Stainless Steel Segments, respectively.

One of the sampled sites is located in Canada, and EPA used the data from the Canadian site to estimate average pollutant concentrations because it represents hot forming wastewater characteristics. The site was not included in the loadings analysis, because it is outside the scope of this proposed U.S. regulation.

10.6.2 Treated Pollutant Loadings

EPA estimated treated pollutant loadings for integrated and stand-alone hot forming sites using the model PNFs and arithmetic LTAs. Loadings reductions were based on the results of the costing analysis in Section 9. Loads were estimated for the options presented in Section 8: BAT-1 and PSES-1 (where BAT-1 = PSES-1) for both carbon and alloy steel and stainless steel. The model technology for stainless steel in the Integrated and Stand-Alone Hot Forming Subcategory is identical to non-integrated steelmaking and hot forming for stainless steel. EPA transferred the stainless steel arithmetic LTAs from non-integrated steelmaking and hot forming. The table below summarizes the options.

Technology Options for Integrated and Stand-Alone Hot Forming Subcategory Carbon and Alloy Steel and Stainless Steel Segments

Treatment Unit	BAT-1	PSES-1
Scale pit with oil skimming	✔	✔
Roughing clarifier with oil removal	✔	✔
Sludge dewatering	✔	✔
Cooling tower	✔	✔
Multimedia filtration[a]	✔	✔
High-rate recycle	✔	✔
Blowdown treatment		
Multimedia filtration[a]	✔	✔

[a] May be used in recycle circuit or as blowdown treatment.

For carbon and alloy steel options BAT-1 and PSES-1, the available data did not demonstrate removals of ammonia-N or fluoride. For stainless steel options BAT-1 and PSES-1, the available data did not demonstrate removal of fluoride. EPA used the site's baseline concentration for these POCs for the post-compliance loading calculation. For all other POCs, the treatment train was expected to provide treatment and arithmetic LTAs were used. Tables 10-21 and 10-22 present the arithmetic LTAs used to calculate loads for carbon and alloy steel and stainless steel, respectively, for all technology options considered.

EPA used the model PNFs presented in Section 7 for post-compliance flow rates, but only for sites allocated a flow reduction. For carbon and alloy steel sites, direct dischargers were allocated an overall flow reduction of 84 percent, and indirect dischargers were allocated an overall flow reduction of 74 percent. Flow reductions for four of the direct dischargers are from sites with co-treatment systems for ironmaking, steelmaking, and/or hot forming wastewaters. For these four sites, EPA estimated a flow reduction for the entire co-treatment system and then allocated the subcategory-specific portion of the reduction based on the flow generated by the manufacturing operations. EPA allocated the indirect stainless steel dischargers an overall flow reduction of 90 percent.

The following tables summarize the baseline and post-compliance pollutant loadings and associated removals for the Integrated and Stand-Alone Hot Forming Subcategory:

- Table 10-23 - Presents the baseline and post-compliance pollutant loadings, in lbs/yr, for all options for direct dischargers in the Carbon and Alloy Steel Segment;

- Table 10-24 - Presents the baseline and post-compliance pollutant loadings, in lbs/yr, for all options for direct dischargers in the Stainless Steel Segment;

- Table 10-25 - Presents the baseline and post-compliance loadings, in lbs/yr, for all options for indirect dischargers in the Carbon and Alloy Steel Segment;

- Table 10-26 - Presents the baseline and post-compliance loadings, in lbs/yr, for all options for indirect dischargers in the Stainless Steel Segment;

- Table 10-27 - Presents the pollutant removals, in lbs/yr, for all options for direct dischargers in the Carbon and Alloy Steel Segment;

- Table 10-28 - presents the pollutant removals, in lbs/yr, for all options for direct dischargers in the Stainless Steel Segment;

- Table 10-29 - presents the pollutant removals, in lbs/yr, for all options for indirect dischargers in the Carbon and Alloy Steel Segment; and

- Table 10-30 - presents the pollutant removals, in lbs/yr, for all options for indirect dischargers in the Stainless Steel Segment.

10.7 Pollutant Loadings for the Non-Integrated Steelmaking and Hot Forming Subcategory

EPA estimated loadings for the 54 carbon and alloy steel and 8 stainless steel sites that generate and discharge process wastewater from non-integrated operations. The loads were based on data from sites that responded to the industry survey: 41 carbon and alloy and eight stainless steel. Thirty-one surveyed carbon and alloy steel sites discharge directly and 10 discharge indirectly. Five surveyed stainless steel sites discharge directly and three discharge indirectly. EPA estimated pollutant loadings for the 10 POCs for the Carbon and Alloy Steel Segment and 21 of the 22 POCs for the Stainless Steel Segment.

10.7.1 Baseline Pollutant Loadings

EPA estimated baseline loadings for non-integrated steelmaking and hot forming sites using the flow rates reported in the industry survey and used available site data (self-monitoring, sampling, or permit application data) for the baseline concentrations. Twenty-eight of the surveyed sites did not provide monitoring data, and EPA had no sampling data for these sites. Fifteen carbon and alloy steel and six stainless steel sites provided analytical data. Most of the sites monitored for chromium, copper, TPH (measured as SGT-HEM), iron, nickel, lead, and zinc. Several monitored for aluminum, antimony, and molybdenum. For all POCs that sites did not monitor, EPA used average baseline concentrations to fill data gaps.

EPA calculated the average baseline concentration using sampling data and self-monitoring data for the direct dischargers. Except for the pollutants listed in the above paragraph, EPA used sampling data to calculate an average baseline concentration. For the Carbon and Alloy Steel Segment, EPA used data from one direct discharging site. For the Stainless Steel Segment, EPA used sampling data from two direct discharging specialty sites. Tables 10-31 and 10-32 present the average baseline pollutant concentrations used to fill data gaps for the POCs with calculated loads for carbon and alloy steel and stainless steel, respectively.

10.7.2 Treated Pollutant Loadings

EPA estimated treated pollutant loadings for non-integrated steelmaking and hot forming sites using the model PNFs and arithmetic LTAs. Loadings reductions were based on the results of the costing analysis in Section 9. Pollutant loads were estimated for the options presented in Section 8 shown in the table below.

Technology Options for Non-Integrated Steelmaking and Hot Forming Carbon and Alloy Steel and Stainless Steel Segments

Treatment Unit	BAT-1	BAT-2	PSES-1
Scale pit with oil skimming (continuous casting and hot forming only)	✔	✔	✔
Clarifier	✔	✔	✔
Sludge dewatering	✔	✔	✔
Cooling tower	✔	✔	✔
Multimedia filtration[a]	✔	✔	✔
High-rate recycle	✔	✔	✔
Blowdown treatment			
Metals precipitation[a,b]		✔	
Multimedia filtration[a]	✔	✔	✔

[a]May be used in recycle circuit or as blowdown treatment.
[b]Applies to Stainless Steel Segment only.

For both the Carbon and Alloy Steel and Stainless Steel Segments, BAT-1 = PSES-1. For carbon and alloy steel options BAT-1 and PSES-1, the available data did not demonstrate removal of ammonia-N. For stainless steel BAT-1, BAT-2, and PSES-1, available data did not demonstrate removals of the following POCs: ammonia-N, nitrate/nitrite, and fluoride. For these POCs, the site's baseline concentration was used for the post-compliance loading calculation. For all other POCs, the treatment train was expected to provide treatment. For stainless steel, BAT-2 = BAT-1 plus metals precipitation. The BAT-2 model technology did not achieve significantly better effluent quality based on the available data, and removals calculated over BAT-1 are too small to be reflected in the aggregate loads tables in this section. Tables 10-33 and 10-34 present the arithmetic LTAs used to calculate loads for the Carbon and Alloy Steel and Stainless Steel Segments, respectively, for all technology options considered.

For carbon and alloy steel sites, the following overall flow reductions were achieved: 90 percent for direct dischargers, and 32 percent for indirect dischargers. For stainless steel sites, the following overall flow reductions were achieved: 52 percent for direct dischargers, and 89 percent for indirect dischargers.

The following tables summarize the baseline and post-compliance pollutant loadings and associated removals for the Non-Integrated Steelmaking and Hot Forming Subcategory:

- Table 10-35 - Presents the baseline and post-compliance pollutant loadings, in lbs/yr, for all options for direct dischargers in the Carbon and Alloy Steel Segment;

- Table 10-36 - Presents the baseline and post-compliance pollutant loadings, in lbs/yr, for all options for direct dischargers in the Stainless Steel Segment;

- Table 10-37 - Presents the baseline and post-compliance pollutant loadings, in lbs/yr, for all options for indirect dischargers in the Carbon and Alloy Steel Segment;

- Table 10-38 - Presents the baseline and post-compliance pollutant loadings, in lbs/yr, for all options for indirect dischargers in the Stainless Steel Segment;

- Table 10-39 - Presents the pollutant removals, in lbs/yr, for all options for direct dischargers in the Carbon and Alloy Steel Segment;

- Table 10-40 - Presents the pollutant removals, in lbs/yr, for all options for direct dischargers in the Stainless Steel Segment;

- Table 10-41 - Presents the pollutant removals, in lbs/yr, for all options for indirect dischargers in the Carbon and Alloy Steel Segment; and

- Table 10-42 - Presents the pollutant removals, in lbs/yr, for all options for indirect dischargers in the Stainless Steel Segment.

10.8 Pollutant Loadings for the Steel Finishing Subcategory

EPA estimated loadings for the 114 sites that generate and discharge process wastewater from steel finishing operations. Loads were based on the 93 sites that responded to the industry survey: 66 carbon and alloy steel and 27 stainless steel. Forty-three surveyed carbon and alloy steel sites discharge directly and 23 discharge indirectly. Nineteen surveyed stainless steel sites discharge directly and 8 discharge indirectly. For each site, EPA considered process lines separately, including the following operations: acid pickling, alkaline cleaning, annealing, electroplating, hot dip cleaning, and cold forming. EPA estimated pollutant loadings for 30 POCs for the Carbon and Alloy Steel Segment and 35 POCs for the Stainless Steel Segment.

10.8.1 Baseline Pollutant Loadings

EPA estimated baseline loadings for steel finishing sites using the flow rates reported in the industry survey and used available site data (self-monitoring, sampling, or permit application data) for the baseline concentrations. Thirty-nine surveyed sites provided data representative of steel finishing wastewaters: 18 direct dischargers for the Carbon and Alloy Steel Segment; nine direct dischargers for the Stainless Steel Segment; 10 indirect dischargers for the Carbon and Alloy Steel Segment; and two indirect dischargers for the Stainless Steel Segment.

To fill data gaps, EPA calculated an average baseline concentration with sampling and self-monitoring data. EPA calculated averages for each segment, type of operation (cold rolling, alkaline cleaning, acid pickling, etc.), and discharge type. EPA had sampling data for three carbon and alloy steel direct dischargers, one carbon and alloy steel indirect discharger, and two stainless steel direct dischargers. Tables 10-43 and 10-44 present the average baseline pollutant concentrations for Carbon and Alloy Steel and Stainless Steel Segments, respectively, used for data transfers for the POCs with calculated loads.

10.8.2 Treated Pollutant Loadings

EPA estimated treated pollutant loadings for steel finishing using the model PNFs and arithmetic LTAs. Loadings reductions were based on the results of the costing analysis in Section 9. Loads were estimated for the options presented in Section 8, as shown in the table below.

**Technology Options for Steel Finishing Subcategory
Carbon and Alloy Steel and Stainless Steel Segments**

Treatment Unit	BAT-1	PSES-1
In-Process Controls		
Countercurrent rinses	✔	✔
Recycle of fume scrubber water	✔	✔
Acid purification units (stainless steel only)	✔	✔
Wastewater Treatment		
Diversion tank	✔	✔
Oil removal	✔	✔
Hydraulic and waste loading equalization	✔	✔
Hexavalent chromium reduction	✔	✔
Multiple-stage pH control for metals precipitation	✔	✔
Clarification	✔	✔
Sludge dewatering	✔	✔

EPA selected two sites to represent the BAT-1 and PSES-1 options for the Carbon and Alloy Steel Segment and one site to represent BAT-1 and PSES-1 options for the Stainless Steel Segment. For steel finishing technology options, available data did not demonstrate removals of the following POCs in the loadings analysis, as shown below.

Segment	Option	Pollutants Treated By the Option
Carbon and Alloy Steel	BAT-1 and PSES-1	Acetone
		alpha-Terpineol
		Ammonia-N
		Bis(2-ethylhexyl) phthalate
		Fluoride
		n-Dodecane
		n-Hexadecane
		Nitrate/nitrite
		Total phenols

Segment	**Option**	**Pollutants Treated By the Option**
Stainless Steel	BAT-1 and PSES-1	Acetone
		Ammonia-N
		Hexanoic acid
		n-Dodecane
		n-Hexadecane
		Total cyanide
		Total phenols

For these POCs, the site's baseline concentration was used for the post-compliance loading calculation. For all other POCs, the arithmetic LTAs were used. Tables 10-45 and 10-46 present the arithmetic LTAs used to calculate loads for the Carbon and Alloy Steel and Stainless Steel Segments, respectively, for all technology options considered.

EPA estimated that the following overall flow reductions could be achieved for carbon and alloy steel sites: 59 percent for direct dischargers, and 30 percent for indirect dischargers. For stainless steel sites, the following overall flow reductions were achieved: 47 percent for direct dischargers, and 23 percent for indirect dischargers.

The following tables summarize the baseline and post-compliance pollutant loadings and associated pollutant removals for the Steel Finishing Subcategory:

- <u>Table 10-47</u> - Presents the baseline and post-compliance pollutant loadings, in lbs/yr, for all options for direct dischargers in the Carbon and Alloy Steel Segment;

- <u>Table 10-48</u> - Presents the baseline and post-compliance pollutant loadings, in lbs/yr, for all options for direct dischargers in the Stainless Steel Segment;

- <u>Table 10-49</u> - Presents the baseline and post-compliance pollutant loadings, in lbs/yr, for all options for indirect dischargers in the Carbon and Alloy Steel Segment;

- <u>Table 10-50</u> - Presents the baseline and post-compliance pollutant loadings, in lbs/yr, for all options for indirect dischargers in the Stainless Steel Segment;

- <u>Table 10-51</u> - Presents the pollutant removals, in lbs/yr, for all options for direct dischargers in the Carbon and Alloy Steel Segment;

- Table 10-52 - Presents the pollutant removals, in lbs/yr, for all options for direct dischargers in the Stainless Steel Segment;

- Table 10-53 - Presents the pollutant removals, in lbs/yr, for all options for indirect dischargers in the Carbon and Alloy Steel Segment; and

- Table 10-54 - Presents the pollutant removals, in lbs/yr, for all options for indirect dischargers in the Stainless Steel Segment.

10.9 Pollutant Loadings for the Other Operations Subcategory

EPA estimated loadings for the two DRI sites and eight forging sites that generate and discharge process wastewater. One DRI site discharges directly and one discharges indirectly. Five forging sites discharge directly and three discharge indirectly.

EPA did not have sufficient monitoring data to estimate pollutant loadings for many of the POCs for the DRI Segment. Based on available data, EPA only had data to estimate loadings for the three pollutants, aluminum, iron, and total suspended solids, for DRI sites. For forging sites, EPA only had data to estimate loadings for O&G as HEM.

The only pollutant loadings EPA calculated for forging indirect dischargers were for O&G as HEM, which is a conventional pollutant. Because POTWs are designed to treat conventional pollutants, the removal of O&G as HEM is incidental, and BPT limits do not apply to indirect dischargers. Pollutant loadings and removals for the indirect dischargers in the forging segment are not presented.

10.9.1 Baseline Pollutant Loadings

EPA used site-specific data where available for baseline concentrations. For POCs that sites did not monitor, EPA used the average of available baseline concentration data. Both DRI sites provided data for the POCs for which loads were calculated, and no average baseline concentration was calculated. EPA determined the average baseline concentration from the three forging sites that provided data. Table 10-55 presents the average forging baseline pollutant concentrations for the POCs for which loads were calculated.

10.9.2 Treated Pollutant Loadings

EPA estimated treated pollutant loadings for the Other Operations Subcategory using the model PNFs and arithmetic LTAs. Loadings reductions were based on the results of the costing analysis in Section 9. Loads were estimated for the options presented in Section 8 as shown below.

Technology Options for DRI Segment

Treatment Unit	BPT
Classifier	✔
Clarifier	✔
Cooling tower	✔
High-rate recycle	✔
Blowdown treatment	
Multimedia filtration	✔

Technology Options for Forging Segment

Treatment Unit	BPT
High-rate recycle	✔
Blowdown treatment	
Oil/water separator	✔

For DRI, EPA selected one site to represent the model effluent treatment technology. For forging, EPA transferred an arithmetic average from the integrated and stand-alone hot forming subcategory carbon and alloy segment. Tables 10-56 and 10-57 present the arithmetic LTAs used to calculate BPT loads for the DRI and Forging Segments, respectively.

The pollutant loadings and associated removals for DRI are not shown because they contain confidential business information. Table 10-58 presents baseline and treated pollutant loadings for forging direct dischargers; Table 10-59 presents removals. EPA did not present loadings for the forging indirect discharging sites, because O&G does not pass through.

10.10 References

10-1 U.S. Environmental Protection Agency. Fate of Priority Pollutants in Publicly Owned Treatment Works. EPA 440/1-82/303. Washington, D.C., September 1982.

10-2 U.S. Environmental Protection Agency. National Risk Management Research Laboratory (NRMRL) Treatability Database Version 5.0. Cincinnati, OH, 1994.

10-3 American Public Health Association, American Water Works Association, and Water Environment Federation. Standard Methods for the Examination of Water and Wastewater 19th Edition, Washington, D.C., 1995.

Table 10-1

Pollutants of Concern Not Detected in Effluent at Any Site

Subcategory	Operation	Type	Pollutant
Cokemaking	By-Product Cokemaking	Bulk conventional/ nonconventional pollutants	Silica gel treated hexane extractable material (SGT-HEM)
		Priority and nonconventional volatile organic constituents	Carbon disulfide
			1,2-Dichloroethane
			Ethylbenzene
			m-Xylene
			m- + p-Xylene
			o-Xylene
			o- + p-Xylene
		Priority and nonconventional semivolatile organic constituents	Acenaphthene
			Acenaphthylene
			Anthracene
			Benzidine
			2,3-benzofluorene
			Benzo(ghi)perylene
			Biphenyl
			2-Butanone
			Carbazole
			Dibenzothiophene
			Fluorene
			n-Hexadecane
			Indeno(1,2,3-cd)pyrene
			4,5-Methylene phenanthrene
			1-Methylphenanthrene
			alpha-Naphthylamine
			beta-Naphthylamine
			Perylene

Table 10-1 (Continued)

Subcategory	Operation	Type	Pollutant
Cokemaking (cont.)	By-Product Cokemaking (cont.)	Priority and nonconventional semivolatile organic constituents (cont.)	2-Picoline
			Styrene
			Thianaphthene
			Toluene
	Nonrecovery Cokemaking	NA	NA
Ironmaking	Blast Furnace Ironmaking	Bulk conventional/ nonconventional pollutants	Silica gel treated hexane extractable material (SGT-HEM)
		Dioxins and furans	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
	Sintering	Bulk conventional/ nonconventional pollutants	Silica gel treated hexane extractable material (SGT-HEM)
		Priority and nonconventional metals	Silver
		Priority and nonconventional volatile organic constituents	Benzo(a)anthracene
			Benzo(b)fluoranthene
			Benzo(k)fluoranthene
			Benzo(a)pyrene
			Chrysene
			n-Docosane
			n-Eicosane
			n-Hexadecane
			n-Octadecane
			Pyrene
			n-Tetracosane
		Dioxins and furans	1,2,3,4,7,8-Heptachlorodibenzo-p-dioxin
			1,2,3,4,7,8,9-Heptachlorodibenzofuran
			1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
			1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
			1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
			1,2,3,7,8,9-Hexachlorodibenzofuran
			1,2,3,7,8-Pentachlorodibenzo-p-dioxin

Table 10-1 (Continued)

Subcategory	Operation	Type	Pollutant
Ironmaking (cont.)	Sintering (cont.)	Dioxins and furans (cont.)	Octachlorodibenzo-p-dioxin
			Octachlorodibenzofuran
Integrated Steelmaking	NA	Priority and nonconventional metals	Beryllium
			Nickel
Integrated and Stand-Alone Hot Forming	Carbon and Alloy Steel	NA	NA
	Stainless Steel	NA	NA
Non-Integrated Steelmaking and Hot Forming	Carbon and Alloy Steel	NA	NA
Non-integrated steelmaking and hot forming	Stainless Steel	Priority and nonconventional volatile organic constituents	Tribromomethane
Finishing	Carbon and Alloy Steel	Priority and nonconventional metals	Selenium
		Priority and nonconventional volatile organic constituents	1,1,1-Trichloroethane
		Priority and nonconventional semivolatile organic constituents	Benzoic acid
			N,N-Dimethylformamide
			n-Eicosane
			n-Octadecane
			n-Tetradecane
	Stainless Steel	Priority and nonconventional metals	Cadmium
			Selenium
			Vanadium
		Priority and nonconventional volatile organic constituents	Ethylbenzene
			Toluene
			m-Xylene
			o- + p-Xylene

Table 10-1 (Continued)

Subcategory	Operation	Type	Pollutant
Finishing (cont.)	Stainless Steel (cont.)	Priority and nonconventional semivolatile organic constituents (cont.)	Benzoic acid
			2,6-Di-tert-butyl-p-benzoquinone
			n-Docosane
			n-Eicosane
			Naphthalene
			n-Octadecane
			2-Methylnaphthalene
			Phenol
			n-Tetracosane
			n-Tetradecane
Other Operations	DRI	Priority and nonconventional metals	Titanium

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

NA- No POCs were excluded for this segment.

Table 10-2

POTW Percent Removal Efficiency

Pollutant	CAS Number[a]	Percent Removal	Data Source
Conventional and Classic Pollutants			
Amenable cyanide	C025	93%	Transfer from WAD cyanide
Ammonia-N (NH3-N)	7664417	39%	50-POTW Study - data >10 × ML
BOD 5-day carbonaceous	C002	91%	Transfer from BOD_5 (50-POTW Study - data >10 × ML)
Chemical oxygen demand (COD)	C004	81%	50-POTW Study - data >10 × ML
Fluoride	16984488	54%	NRMRL Treatability Database (all wastewaters)
Hexane extractable material (HEM)	C036	87%	Used O&G percent removal (50-POTW Study - data >10 × ML)
Nitrate/nitrite (NO2 + NO3-N)	C005	90%	Transfer from TKN
Silica gel treated hexane extractable material (SGT-HEM)	C037	87%	Used O&G percent removal (50-POTW Study - data >10 × ML)
Thiocyanate	302045	70%	Transfer from total cyanide
Total cyanide	57125	70%	50-POTW Study - data >10 × ML
Total Kjeldahl nitrogen (TKN)	C021	90%	Based on data from POTWs receiving iron and steel wastewater
Total organic carbon (TOC)	C012	70%	50-POTW Study - data >10 × ML
Total phenols	C020	77%	50-POTW Study - data >10 × ML
Total suspended solids (TSS)	C009	90%	50-POTW Study - data >10 × ML
Weak acid dissociable cyanide	C042	93%	Based on data from POTW receiving iron and steel wastewater
Metals			
Aluminum	7429905	91%	50-POTW Study - data >10 × ML
Antimony	7440360	67%	50-POTW Study - data >2 × ML
Arsenic	7440382	66%	50-POTW Study - data >2 × ML
Barium	7440393	55%	50-POTW Study - data >2 × ML
Beryllium	7440417	61%	NRMRL Treatability Database (industrial wastewater)
Boron	7440428	24%	50-POTW Study - data >2 × ML
Cadmium	7440439	90%	50-POTW Study - data >10 × ML
Chromium	7440473	80%	50-POTW Study - data >10 × ML
Chromium, hexavalent	18540299	6%	NRMRL Treatability Database (all wastewater)
Cobalt	7440484	10%	50-POTW Study - data >2 × ML
Copper	7440508	84%	50-POTW Study - data >10 × ML
Iron	7439896	82%	50-POTW Study - data >10 × ML
Lead	7439921	77%	50-POTW Study - data >10 × ML
Magnesium	7439954	14%	50-POTW Study - data >10 × ML
Manganese	7439965	36%	50-POTW Study - data >10 × ML

Table 10-2 (Continued)

Pollutant	CAS Number[a]	Percent Removal	Data Source
Metals (continued)			
Mercury	7439976	90%	50-POTW Study - data >10 × ML
Molybdenum	7439987	19%	50-POTW Study - data >10 × ML
Nickel	7440020	51%	50-POTW Study - data >10 × ML
Selenium	7782492	34%	NRMRL Treatability Database (domestic wastewater)
Silver	7440224	88%	50-POTW Study - data >10 × ML
Thallium	7440280	54%	NRMRL Treatability Database (all wastewater)
Tin	7440315	43%	50-POTW Study - data >2 × ML
Titanium	7440326	92%	50-POTW Study - data >10 × ML
Vanadium	7440622	8%	50-POTW Study - data >2 × ML
Zinc	7440666	79%	50-POTW Study - data >10 × ML
Organic Pollutants			
2,4-Dimethylphenol	105679	51%	50-POTW Study - data >2 × ML
2-Methylnaphthalene	91576	28%	NRMRL Treatability Database (industrial wastewater)
2-Phenylnaphthalene	612942	85%	Centralized Water Treaters (CWT) Project - no source listed
alpha-Terpineol	98555	94%	NRMRL Treatability Database (industrial wastewater)
Acetone	67641	84%	NRMRL Treatability Database (all wastewater)
Aniline	62533	93%	NRMRL Treatability Database (all wastewater)
Benzene	71432	95%	50-POTW Study - data >10 × ML
Benzo(a)anthracene	56553	98%	NRMRL Treatability Database (domestic wastewater)
Benzo(a)pyrene	50328	95%	NRMRL Treatability Database (all wastewater)
Benzo(b)fluoranthene	205992	95%	NRMRL Treatability Database (all wastewater)
Benzo(k)fluoranthene	207089	95%	NRMRL Treatability Database (all wastewater)
Benzyl alcohol	100516	78%	NRMRL Treatability Database (all wastewater)
Bis(2-ethylhexyl) phthalate	117817	60%	50-POTW Study - data >10 × ML
Carbazole	86748	62%	CWT Project: Generic Removal Group: Anilines
Chrysene	218019	97%	NRMRL Treatability Database (domestic wastewater)
Dibenzofuran	132649	98%	NRMRL Treatability Database (all wastewater)
Fluoranthene	206440	42%	50-POTW Study - data >2 × ML
Hexanoic acid	142621	84%	NRMRL Treatability Database (all wastewater)
n-Dodecane	112403	95%	NRMRL Treatability Database (industrial wastewater)
n-Eicosane	112958	92%	NRMRL Treatability Database (industrial wastewater)
n-Hexadecane	544763	71%	CWT Project: Generic Removal Group: n-Pariffins
n-Octadecane	593453	71%	CWT Project: Generic Removal Group: n-Pariffins
Naphthalene	91203	95%	50-POTW Study - data >10 × ML
o-Cresol	95487	53%	NRMRL Treatability Database (industrial wastewater)

Table 10-2 (Continued)

Pollutant	CAS Number[a]	Percent Removal	Data Source
Organic Pollutants (continued)			
o-Toluidine	95534	93%	Transfer from aniline
p-Cresol	106445	72%	NRMRL Treatability Database (industrial wastewater)
Phenanthrene	85018	95%	50-POTW Study - data >10 × ML
Phenol	108952	95%	50-POTW Study - data >10 × ML
Pyrene	129000	84%	NRMRL Treatability Database (domestic wastewater)
Pyridine	110861	95%	NRMRL Treatability Database (industrial wastewater)
Dioxins/Furans			
2,3,7,8-TCDF	51207319	83%	Transfer from 1,2,3,4,6,7,8-HPCDF (Source: NRMRL)

[a]CAS Number denotes Chemical Abstract Service Number.

Sources: U.S. EPA's Fate of Priority Pollutants in Publicly Owned Treatment Works and U.S. EPA's NRMRL Treatability Database (References 10-1 and 10-2).

Table 10-3

Average Baseline Pollutant Concentrations Used for Data Transfers in the Cokemaking Subcategory By-Product Cokemaking Segment

Pollutant of Concern	Ammonia Still Treatment Effluent Concentration (mg/L)	Biological Treatment Plant Effluent Concentration (mg/L)
Conventional and Classic Pollutants		
Total suspended solids	105	46.1
Hexane extractable material (HEM)	21.8	5.04
Ammonia-N	195	49.1
Nitrate/nitrite	0.67	41.5
Thiocyanate	256	8.44
Total cyanide	3.55	5.12
Amenable cyanide	1.59	1.26
Weak acid dissociable (WAD) cyanide	0.975	0.081
Total phenols	270	0.176
5-day (carbonaceous) biochemical oxygen demand (BOD_5)	1400	66.4
Chemical oxygen demand (COD)	2640	437
Total organic carbon (TOC)	798	36.6
Nonconventional Metals		
Boron	0.376	0.253
Priority Metals		
Arsenic	0.0497	0.0155
Mercury	0.002	0.000270
Selenium	0.827	0.476
Nonconventional Organic Constituents		
Acetone	0.0547	0.0506
2-Methylnaphthalene	0.0336	0.0147
2-Phenylnaphthalene	0.0677	0.0102
Aniline	2.93	0.0102
Dibenzofuran	0.0338	0.0101
n-Eicosane	0.191	0.0101
n-Octadecane	0.385	0.0101
o-Cresol	12.3	0.012

Table 10-3 (Continued)

Pollutant of Concern	Ammonia Still Treatment Effluent Concentration (mg/L)	Biological Treatment Plant Effluent Concentration (mg/L)
Nonconventional Organics (continued)		
o-Toluidine	0.276	0.0101
p-Cresol	71.4	0.0102
Pyridine	0.159	0.0103
Priority Organics Constituents		
Benzene	0.0125	0.00549
Benzo(a)anthracene	0.0687	0.0101
Benzo(a)pyrene	0.0683	0.00860
Benzo(b)fluoranthene	0.0611	0.00806
Benzo(k)fluoranthene	0.0429	0.00756
Chrysene	0.0756	0.0103
Fluoranthene	0.0835	0.0101
Naphthalene	0.06	0.00763
Phenanthrene	0.0554	0.0101
Pyrene	0.066	0.0101
Phenol	158	0.0319
2,4-Dimethylphenol	1.77	0.0101

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-4

Proposed Arithmetic Long-Term Averages for the Cokemaking Subcategory By-Product Cokemaking Segment

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Conventional and Classic Pollutants		
Total suspended solids (TSS)	BAT-1, BAT-2, BAT-3	96.1
	BAT-4	5.65
	PSES-1	[a]
	PSES-2	55.1
	PSES-3, PSES-4	96.1
Hexane extractable material (HEM)	BAT-1, BAT-2, BAT-3, BAT-4	6.72
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	6.72
Ammonia-N	BAT-1, BAT-2	2.57
	BAT-3, BAT-4	0.278
	PSES-1	36.04
	PSES-2	36.04
	PSES-3, PSES-4	2.57
Nitrate/nitrite	BAT-1, BAT-2, BAT-3, BAT-4	166
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	166
Thiocyanate	BAT-1, BAT-2, BAT-3, BAT-4	0.733
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.733
Total cyanide	BAT-1	5.17
	BAT-2	2.26
	BAT-3, BAT-4	1.30
	PSES-1	6.22
	PSES-2, PSES-3	5.17
	PSES-4	1.3
Amenable cyanide	BAT-1, BAT-2, BAT-3, BAT-4	0.977
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.977

Table 10-4 (Continued)

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Conventional and Classic Pollutants (continued)		
Weak acid dissociable (WAD) cyanide	BAT-1, BAT-2, BAT-3, BAT-4	5.17
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	5.17
Total phenols	BAT-1, BAT-2	0.0629
	BAT-3, BAT-4	0.0376
	PSES-1	[a]
	PSES-2	[a]
	PSES-3	0.0629
	PSES-3	0.0376
5-day (carbonaceous) biochemical oxygen demand (BOD_5)	BAT-1, BAT-2, BAT-3, BAT-4	86.5
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	86.5
Chemical oxygen demand (COD)	BAT-1, BAT-2, BAT-3, BAT-4	33.1
	PSES-1	304
	PSES-2	304
	PSES-3, PSES-4	86.5
Total organic carbon (TOC)	BAT-1, BAT-2, BAT-3, BAT-4	15.3
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	15.3
Nonconventional Metals		
Boron	BAT-1, BAT-2, BAT-3, BAT-4	0.5
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.5
Priority Metals		
Arsenic	BAT-1, BAT-2, BAT-3, BAT-4	0.00753
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.00753
Mercury	BAT-1, BAT-2, BAT-3	0.00025
	BAT-4	0.00018
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.00025

Table 10-4 (Continued)

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Priority Metals (continued)		
Selenium	BAT-1, BAT-2, BAT-3, BAT-4	0.109
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.109
Nonconventional Organic Constituents		
Acetone	BAT-1, BAT-2, BAT-3, BAT-4	0.05
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.05
2-Methylnaphthalene	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101
2-Phenylnaphthalene	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101
Aniline	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101
Dibenzofuran	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101
n-Eicosane	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101
n-Octadecane	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101
o-Cresol	BAT-1, BAT-2, BAT-3, BAT-4	0.0152
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0152

Table 10-4 (Continued)

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Nonconventional Organic Constituents (continued)		
o-Toluidine	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101
p-Cresol	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101
Pyridine	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101
Priority Organic Constituents		
Benzene	BAT-1	0.00183
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.00183
Benzo(a)anthracene	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101
Benzo(a)pyrene	BAT-1, BAT-2, BAT-3, BAT-4	0.0076
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0076
Benzo(b)fluoranthene	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101
Benzo(k)fluoranthene	B BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101
Chrysene	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101

Table 10-4 (Continued)

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Priority Organic Constituents (continued)		
Fluoranthene	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101
Naphthalene	BAT-1, BAT-2, BAT-3, BAT-4	0.0121
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0121
Phenanthrene	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101
Pyrene	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101
Phenol	BAT-1, BAT-2, BAT-3, BAT-4	0.0376
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0376
2,4-Dimethylphenol	BAT-1, BAT-2, BAT-3, BAT-4	0.0101
	PSES-1	[a]
	PSES-2	[a]
	PSES-3, PSES-4	0.0101

[a]Data for PSES-1 and PSES-2 model sites did not demonstrate removal of these pollutants. For the treated pollutant loading, EPA used the sites baseline effluent concentrations.

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-5

Summary of Baseline and Post-Compliance Pollutant Loadings for the By-Product Cokemaking Segment Direct Dischargers

Pollutant Group	Baseline Load (lbs/yr)	Treated Load Discharged to Surface Water (lbs/yr)			
		BAT-1	BAT-2	BAT-3	BAT-4
Total conventionals	2,310,000	2,100,000	2,100,000	2,100,000	1,630,000
Total priority metals	7,900	5,420	5,420	5,420	5,420
Total nonconventional metals	7,710	7,520	7,520	7,520	7,520
Total nonconventional organic constituents	3,500	3,360	3,360	3,360	3,360
Total priority organic constituents	4,880	4,750	4,750	4,750	4,750
Total nonconventional other	2,710,000	2,320,000	2,320,000	2,290,000	2,290,000
Total cyanide	61,400	56,800	43,300	21,200	21,200
Chemical oxygen demand (COD)	4,660,000	2,050,000	2,050,000	2,050,000	2,050,000
Total organic carbon (TOC)	448,000	300,000	300,000	300,000	300,000
Total phenols	1,630	863	863	617	617

Table 10-6

Summary of Baseline and Post-Compliance Pollutant Loadings for the By-Product Cokemaking Segment Indirect Dischargers

Pollutant Group	Baseline Load (lbs/yr)	Treated Load Discharged from POTW (lbs/yr)			
		PSES-1	PSES-2	PSES-3	PSES-4
Total conventionals	392,000	392,000	374,000	57,400	57,400
Total priority metals	2,230	2,230	2,230	309	309
Total nonconventional metals	1,110	1,110	1,110	1,050	1,050
Total nonconventional organic constituents	70,000	70,000	70,000	112	112
Total priority organic constituents	20,100	20,100	20,100	72.0	72.0
Total nonconventional other	460,000	279,000	285,000	14,500	8,700
Total cyanide	7,240	4,450	2,430	4,030	1,380
Chemical oxygen demand (COD)	1,490,000	794,000	652,000	68,200	68,200
Total organic carbon (TOC)	658,000	658,000	658,000	19,100	19,100
Total phenols	158,000	158,000	158,000	47.0	31.0

Table 10-7

Summary of Pollutant Removals for the By-Product Cokemaking Segment Direct Dischargers

Pollutant Group	Pollutant Removals (lbs/yr)			
	BAT-1	BAT-2	BAT-3	BAT-4
Total conventionals	206,000	206,000	206,000	676,00
Total priority metals	2,480	2,480	2,480	2,480
Total nonconventional metals	191	191	191	191
Total nonconventional organic constituents	141	141	141	141
Total priority organic constituents	130	130	130	130
Total nonconventional other	388,000	388,000	422,000	422,000
Total cyanide	4,590	18,100	40,200	40,200
Chemical oxygen demand (COD)	2,620,000	2,620,000	2,620,000	2,620,000
Total organic carbon (TOC)	148,000	148,000	148,000	148,000
Total phenols	764	764	1,010	1,010

Table 10-8

Summary of Pollutant Removals for the By-Product Cokemaking Subcategory Indirect Dischargers

Pollutant Name	Pollutant Removals, lbs/yr			
	PSES-1	PSES-2	PSES-3	PSES-4
Total priority metals	-	-	1,920	1,920
Total nonconventional metals	-	-	57	57
Total nonconventional organic constituents	-	-	69,800	69,800
Total priority organic constituents	-	-	20,000	20,000
Total nonconventional other	182,000	175,000	446,000	452,000
Total cyanide	2,790	4,820	3,210	5,870
Chemical oxygen demand (COD)	692,000	834,000	1,420,000	1,420,000
Total organic carbon (TOC)	-	-	639,000	639,000
Total phenols	-	-	158,000	158,000

Table 10-9

Average Baseline Pollutant Concentrations for the Ironmaking Subcategory Sintering Segment

Pollutant of Concern	Type of Discharge[a]	Average Baseline Concentration (mg/L)
Conventional and Classic Pollutants		
Total suspended solids (TSS)	Direct	35.4
Hexane extractable material (HEM)	Direct	6.03
Total Kjeldahl nitrogen (TKN)	Direct	45.9
Ammonia-N	Direct	46.1
Nitrate/nitrite	Direct	3.02
Thiocyanate	Direct	0.204
Total cyanide	Direct	0.0568
Amenable cyanide	Direct	0.0342
Weak acid dissociable (WAD) cyanide	Direct	0.0212
Total phenols	Direct	0.0912
Chemical oxygen demand (COD)	Direct	79.7
Total organic carbon (TOC)	Direct	17
Fluoride	Direct	25.3
Nonconventional Metals		
Aluminum	Direct	1.18
Boron	Direct	1.49
Iron	Direct	1.47
Magnesium	Direct	45.2
Manganese	Direct	4.83
Titanium	Direct	0.0178
Priority Metals		
Arsenic	Direct	0.0229
Cadmium	Direct	0.0345
Chromium	Direct	0.00444
Copper	Direct	0.0829
Lead	Direct	0.229

Table 10-9 (Continued)

Pollutant of Concern	Type of Discharge[a]	Average Baseline Concentration (mg/L)
Priority Metals (continued)		
Mercury	Direct	0.00047
Selenium	Direct	0.068
Thallium	Direct	0.754
Zinc	Direct	0.505
Nonconventional Organic Constituents		
o-Cresol	Direct	0.0137
p-Cresol	Direct	0.017
Pyridine	Direct	0.176
1,2,3,4,6,7,8-Heptachlorodibenzofuran	Direct	1.99E-07
1,2,3,4,7,8-Hexachlorodibenzofuran	Direct	1.38E-07
1,2,3,6,7,8-Hexachlorodibenzofuran	Direct	1.15E-07
1,2,3,7,8-Pentachlorodibenzofuran	Direct	1.33E-07
2,3,4,6,7,8-Hexachlorodibenzofuran	Direct	8.60E-08
2,3,4,7,8-Pentachlorodibenzofuran	Direct	2.04E-07
2,3,7,8-Tetrachlorodibenzofuran	Direct	1.53E-07
Priority Organic Constituents		
Fluoranthene	Direct	0.0146
Phenanthrene	Direct	0.0201
Phenol	Direct	0.0324
2,4-Dimethylphenol	Direct	0.0309
4-Nitrophenol	Direct	0.366

[a]The sintering segment only included direct dischargers; therefore, EPA did not calculate an average baseline pollutant concentration for indirect dischargers.

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-10

Average Baseline Pollutant Concentrations for the Ironmaking Subcategory Blast Furnace Segment

Pollutant of Concern	Type of Discharge	Average Baseline Concentration (mg/L)
Conventional and Classic Pollutants		
Total suspended solids (TSS)	Direct	40.7
	Indirect	40.7
Hexane extractable material (HEM)	Direct	5.54
	Indirect	5.54
Total Kjeldahl nitrogen (TKN)	Direct	112
	Indirect	112
Ammonia-N	Direct	65.5
	Indirect	35.7
Nitrate/nitrite	Direct	2.45
	Indirect	2.45
Thiocyanate	Direct	0.148
	Indirect	0.148
Total cyanide	Direct	0.658
	Indirect	0.26
Amenable cyanide	Direct	0.0304
	Indirect	0.0304
Weak acid dissociable (WAD) cyanide	Direct	0.0150
	Indirect	0.0150
Chemical oxygen demand (COD)	Direct	274
	Indirect	274
Total organic carbon (TOC)	Direct	12.6
	Indirect	12.6
Fluoride	Direct	9.89
	Indirect	9.89

Table 10-10 (Continued)

Pollutant of Concern	Type of Discharge	Average Baseline Concentration (mg/L)
Nonconventional Metals		
Aluminum	Direct	0.171
	Indirect	0.171
Boron	Direct	1.21
	Indirect	1.21
Iron	Direct	4.29
	Indirect	4.29
Magnesium	Direct	59.5
	Indirect	59.5
Manganese	Direct	1.76
	Indirect	1.76
Molybdenum	Direct	0.0408
	Indirect	0.0408
Titanium	Direct	0.00380
	Indirect	0.00380
Priority Metals		
Chromium	Direct	0.00691
	Indirect	0.00691
Copper	Direct	0.00654
	Indirect	0.00654
Lead	Direct	0.0528
	Indirect	0.1
Nickel	Direct	0.0214
	Indirect	0.0214
Selenium	Direct	0.003
	Indirect	0.003
Zinc	Direct	0.967
	Indirect	0.08

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-11

Proposed Arithmetic Long-Term Averages for the Ironmaking Subcategory Sintering Segment

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Conventional and Classic Pollutants		
Total suspended solids (TSS)	BAT-1	18.7
	PSES-1	18.7
Hexane extractable material (HEM)	BAT-1	5.85
	PSES-1	5.85
Total Kjeldahl nitrogen (TKN)	BAT-1	65.7
	PSES-1	65.7
Ammonia-N	BAT-1	0.278
	PSES-1	70.5
Nitrate/nitrite	BAT-1	7.31
	PSES-1	7.31
Thiocyanate	BAT-1	0.118
	PSES-1	0.118
Total cyanide	BAT-1	1.3
	PSES-1	0.0725
Amenable cyanide	BAT-1	0.0244
	PSES-1	0.0244
Weak acid dissociable (WAD) cyanide	BAT-1	0.0171
	PSES-1	0.0171
Total phenols	BAT-1	0.01
	PSES-1	0.01
Chemical oxygen demand (COD)	BAT-1	42.9
	PSES-1	42.9
Total organic carbon (TOC)	BAT-1	13.2
	PSES-1	13.2
Fluoride	BAT-1	14
	PSES-1	14

Table 10-11 (Continued)

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Nonconventional Metals		
Aluminum	BAT-1	0.586
	PSES-1	0.586
Boron	BAT-1	0.365
	PSES-1	0.365
Iron	BAT-1	2.58
	PSES-1	2.58
Magnesium	BAT-1	27.1
	PSES-1	27.1
Manganese	BAT-1	0.308
	PSES-1	0.308
Titanium	BAT-1	0.0016
	PSES-1	0.0016
Priority Metals		
Arsenic	BAT-1	0.0046
	PSES-1	0.0046
Cadmium	BAT-1	0.00636
	PSES-1	0.00636
Chromium	BAT-1	0.0149
	PSES-1	0.0149
Copper	BAT-1	0.0084
	PSES-1	0.0084
Lead	BAT-1	0.00338
	PSES-1	0.0169
Mercury	BAT-1	0.000223
	PSES-1	0.000223
Selenium	BAT-1	0.0075
	PSES-1	0.0075
Thallium	BAT-1	0.0578
	PSES-1	0.0578

Table 10-11 (Continued)

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Priority Metals (continued)		
Zinc	BAT-1	0.037
	PSES-1	0.422
Fluoranthene	BAT-1	0.01
	PSES-1	0.01
Nonconventional Organic Constituents		
o-Cresol	BAT-1	0.01
	PSES-1	0.01
p-Cresol	BAT-1	0.01
	PSES-1	0.01
1,2,3,4,6,7,8-Heptachlorodibenzofuran	BAT-1	5E-08
	PSES-1	5E-08
1,2,3,4,7,8-Hexachlorodibenzofuran	BAT-1	5E-08
	PSES-1	5E-08
1,2,3,6,7,8-Hexachlorodibenzofuran	BAT-1	5E-08
	PSES-1	5E-08
2,3,4,6,7,8-Hexachlorodibenzofuran	BAT-1	5E-08
	PSES-1	5E-08
1,2,3,7,8-Pentachlorodibenzofuran	BAT-1	5E-08
	PSES-1	5E-08
2,3,4,7,8-Pentachlorodibenzofuran	BAT-1	5E-08
	PSES-1	5E-08
2,3,7,8-Tetrachlorodibenzofuran	BAT-1	1E-08
	PSES-1	1E-08

Table 10-11 (Continued)

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Priority Organic Constituents		
Phenanthrene	BAT-1	0.01
	PSES-1	0.01
Pyridine	BAT-1	0.0193
	PSES-1	0.0193
Phenol	BAT-1	0.01
	PSES-1	0.01
2,4-Dimethylphenol	BAT-1	0.01
	PSES-1	0.01
4-Nitrophenol	BAT-1	0.05
	PSES-1	0.05

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-12

Proposed Arithmetic Long-Term Averages for the Ironmaking Subcategory Blast Furnace Segment

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Conventional and Classic Pollutants		
Total suspended solids (TSS)	BAT-1	18.7
	PSES-1	18.7
Hexane extractable material (HEM)	BAT-1	5.85
	PSES-1	5.85
Total Kjeldahl nitrogen (TKN)	BAT-1	65.7
	PSES-1	65.7
Ammonia-N	BAT-1	0.278
	PSES-1	70.5
Nitrate/nitrite	BAT-1	7.31
	PSES-1	7.31
Thiocyanate	BAT-1	0.118
	PSES-1	0.118
Total cyanide	BAT-1	1.3
	PSES-1	0.0725
Amenable cyanide	BAT-1	0.0244
	PSES-1	0.0244
Weak acid dissociable (WAD) cyanide	BAT-1	0.0171
	PSES-1	0.0171
Chemical oxygen demand (COD)	BAT-1	42.9
	PSES-1	42.9
Total organic carbon (TOC)	BAT-1	13.2
	PSES-1	13.2
Fluoride	BAT-1	14
	PSES-1	14

Table 10-12 (Continued)

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Nonconventional Metals		
Aluminum	BAT-1	0.586
	PSES-1	0.586
Boron	BAT-1	0.365
	PSES-1	0.365
Iron	BAT-1	2.58
	PSES-1	2.58
Magnesium	BAT-1	27.1
	PSES-1	27.1
Manganese	BAT-1	0.308
	PSES-1	0.308
Molybdenum	BAT-1	0.0386
	PSES-1	0.0386
Titanium	BAT-1	0.0016
	PSES-1	0.0016
Priority Metals		
Chromium	BAT-1	0.0149
	PSES-1	0.0149
Copper	BAT-1	0.0084
	PSES-1	0.0084
Lead	BAT-1	0.00338
	PSES-1	0.0169
Nickel	BAT-1	0.016
	PSES-1	0.016
Selenium	BAT-1	0.0075
	PSES-1	0.0075
Zinc	BAT-1	0.037
	PSES-1	0.422

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-13

Summary of Baseline and Post-Compliance Pollutant Loadings for the Ironmaking Subcategory Direct and Indirect Dischargers

Pollutant Group	Baseline Load (lbs/yr) [a]	Treated Load Discharged to Surface Water at BAT-1 and PSES-1 (lbs/yr)[a]
Total conventionals	2,430,000	172,000
Total priority metals	17,400	741
Total nonconventional metals	3,250,000	252,000
Total nonconventional organic constituents	477	115
Total priority organic constituents	1,060	320
Total nonconventional other	1,880,000	1,310,000
Total cyanide	9,550	3,300
Chemical oxygen demand (COD)	12,300,000	474,000
Total organic carbon (TOC)	705,000	94,000
Total phenols	216	216
Total dioxins/furans	0.00268	0.000908
Total Kjeldahl nitrogen (TKN)	5,360,000	453,000

[a]Data aggregated to protect confidential business information.

Table 10-14

Summary of Pollutant Removals for the Ironmaking Subcategory Direct and Indirect Dischargers

Pollutant Name	Pollutant Removals (lbs/yr)
	BAT-1 and PSES-1[a]
Total conventionals	2,260,000
Total priority metals	16,700
Total nonconventional metals	2,990,000
Total nonconventional organic constituents	362
Total priority organic constituents	741
Total nonconventional other	564,000
Total cyanide	6,250
Chemical oxygen demand (COD)	11,700,000
Total organic carbon (TOC)	611,000
Total phenols	-
Total dioxins/furans	0.00178
Total Kjeldahl nitrogen (TKN)	4,900,000

[a]Data aggregated to protect confidential business information.

Table 10-15

Average Baseline Pollutant Concentrations for the Integrated Steelmaking Subcategory

Pollutant of Concern	Type of Discharge	Average Baseline Concentration (mg/L)
Conventional and Classic Pollutants		
Total suspended solids (TSS)	Direct, Indirect	24.0
Hexane extractable material (HEM)	Direct, Indirect	5.29
Silica gel treated hexane extractable material (SGT-HEM)	Direct, Indirect	5.29
Ammonia-N	Direct, Indirect	0.549
Nitrate/nitrite	Direct, Indirect	0.670
Chemical oxygen demand (COD)	Direct, Indirect	26.8
Total organic carbon (TOC)	Direct, Indirect	8.46
Fluoride	Direct, Indirect	23.7
Nonconventional Metals		
Aluminum	Direct, Indirect	1.49
Cobalt	Direct, Indirect	0.0101
Iron	Direct, Indirect	7.59
Magnesium	Direct, Indirect	6.07
Manganese	Direct, Indirect	0.400
Molybdenum	Direct, Indirect	0.326
Tin	Direct, Indirect	0.00932
Titanium	Direct, Indirect	0.00702
Priority Metals		
Antimony	Direct, Indirect	0.0147
Cadmium	Direct, Indirect	0.00690
Chromium	Direct, Indirect	0.00986
Copper	Direct, Indirect	0.0212
Lead	Direct, Indirect	0.0972
Mercury	Direct, Indirect	0.000204
Silver	Direct, Indirect	0.00652
Zinc	Direct, Indirect	1.36

Table 10-15 (Continued)

Pollutant of Concern	Type of Discharge	Average Baseline Concentration (mg/L)
Priority Organic Constituents		
Phenol	Direct, Indirect	0.0316

[a]Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-16

Proposed Arithmetic Long-Term Averages for the Integrated Steelmaking Subcategory

Pollutant of Concern	Option	Model Effluent Concentration (mg/L)
Conventional and Classic Pollutants		
Total suspended solids (TSS)	BAT-1	7.35
	PSES-1	7.35
Hexane extractable material (HEM)	BAT-1	6.10
	PSES-1	6.10
Silica gel treated hexane extractable material (SGT-HEM)	BAT-1	5.89
	PSES-1	5.89
Total organic carbon (TOC)	BAT-1	9.60
	PSES-1	9.60
Ammonia-N	BAT-1	0.142
	PSES-1	0.142
Nitrate/nitrite	BAT-1	1.76
	PSES-1	1.76
Chemical oxygen demand (COD)	BAT-1	30.9
	PSES-1	30.9
Fluoride	BAT-1	24.4
	PSES-1	24.4
Nonconventional Metals		
Aluminum	BAT-1	0.292
	PSES-1	0.292
Cobalt	BAT-1	0.0105
	PSES-1	0.0105
Iron	BAT-1	1.57
	PSES-1	1.57
Magnesium	BAT-1	57.8
	PSES-1	57.8
Manganese	BAT-1	0.0965
	PSES-1	0.0965
Molybdenum	BAT-1	0.456
	PSES-1	0.456

Table 10-16 (Continued)

Pollutant of Concern	Option	Model Effluent Concentration (mg/L)
Nonconventional Metals (continued)		
Tin	BAT-1	0.00416
	PSES-1	0.00416
Vanadium	BAT-1	0.0154
	PSES-1	0.0154
Priority Metals		
Antimony	BAT-1	0.0799
	PSES-1	0.0799
Cadmium	BAT-1	0.001
	PSES-1	0.001
Chromium	BAT-1	0.0122
	PSES-1	0.0122
Copper	BAT-1	0.0104
	PSES-1	0.0104
Lead	BAT-1	0.0141
	PSES-1	0.0141
Mercury	BAT-1	0.0002
	PSES-1	0.0002
Silver	BAT-1	0.00508
	PSES-1	0.00508
Zinc	BAT-1	0.0932
	PSES-1	0.0932
Priority Organic Constituents		
Phenol	BAT-1	0.01
	PSES-1	0.01

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-17

Summary of Baseline and Post-Compliance Pollutant Loadings for the Integrated Steelmaking Subcategory Direct and Indirect Dischargers

Pollutant Group	Baseline Load (lbs/yr)	Treated Load Discharged to Surface Water (lbs/yr)
		BAT-1 and PSES-1[a]
Total conventionals	2,500,000	650,000
Total priority metals	107,000	15,000
Total nonconventional metals	2,990,000	528,000
Total priority organic constituents	2,850	2,850
Total nonconventional other	3,120,000	1,600,000
Chemical oxygen demand (COD)	3,370,000	648,000
Total organic carbon (TOC)	975,000	189,000
Silica gel treated hexane extractable material (SGT-HEM)	588,000	360,000

[a]Data aggregated to protect confidential business information.

Table 10-18

Summary of Pollutant Removals for the Integrated Steelmaking Subcategory Direct and Indirect Dischargers

Pollutant Group	Pollutant Removals (lbs/yr)
	BAT-1 and PSES-1[a]
Total conventionals	1,850,000
Total priority metals	92,300
Total nonconventional metals	2,470,000
Total priority organic constituents	-
Total nonconventional other	1,520,000
Chemical oxygen demand (COD)	2,720,000
Total organic carbon (TOC)	786,000
Silica gel treated hexane extractable material (SGT-HEM)	228,000

[a]Data aggregated to protect confidential business information.

Table 10-19

Average Baseline Pollutant Concentrations for the Integrated and Stand-Alone Hot Forming Subcategory Carbon and Alloy Steel Segment

Pollutant of Concern	Type of Discharge	Average Baseline Concentration (mg/L)
Conventional and Classic Pollutants		
Total suspended solids (TSS)	Direct	42.4
	Indirect	516
Hexane extractable material (HEM)	Direct	6.04
	Indirect	6.04
Silica gel treated hexane extractable material (SGT-HEM)	Direct	6.04
	Indirect	6.04
Ammonia-N	Direct	0.77
	Indirect	0.77
Chemical oxygen demand (COD)	Direct	77.7
	Indirect	77.7
Fluoride	Direct	6.40
	Indirect	6.40
Nonconventional Metals		
Iron	Direct	7.06
	Indirect	36.4
Manganese	Direct	0.0877
	Indirect	0.0877
Molybdenum	Direct	0.0313
	Indirect	0.0313
Priority Metals		
Lead	Direct	0.0287
	Indirect	0.004
Zinc	Direct	0.0551
	Indirect	0.087

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-20

Average Baseline Pollutant Concentrations for the Integrated and Stand-Alone Hot Forming Subcategory Stainless Steel Segment

Pollutant of Concern	Type of Discharge	Average Baseline Concentration (mg/L)
Conventional and Classic Pollutants		
Total suspended solids (TSS)	Direct	42.4
	Indirect	516
Hexane extractable material (HEM)	Direct	6.04
	Indirect	6.04
Silica gel treated hexane extractable material (SGT-HEM)	Direct	6.04
	Indirect	6.04
Chemical oxygen demand (COD)	Direct	77.7
	Indirect	77.7
Total organic carbon (TOC)	Direct	23.3
	Indirect	23.3
Fluoride	Direct	6.40
	Indirect	6.40
Nonconventional Metals		
Iron	Direct	7.06
	Indirect	36.4
Manganese	Direct	0.0877
	Indirect	0.0877
Molybdenum	Direct	0.0313
	Indirect	0.0313
Titanium	Direct	0.00092
	Indirect	0.00092
Priority Metals		
Antimony	Direct	0.0360
	Indirect	0.0360
Chromium	Direct	0.0104
	Indirect	0.027
Copper	Direct	0.0122
	Indirect	0.3

Table 10-20 (Continued)

Pollutant of Concern	Type of Discharge	Average Baseline Concentration (mg/L)
Priority Metals (continued)		
Nickel	Direct	0.0847
	Indirect	0.138
Zinc	Direct	0.0551
	Indirect	0.087

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-21

Proposed Arithmetic Long-Term Averages for the Integrated and Stand-Alone Hot Forming Subcategory Carbon and Alloy Steel Segment

Pollutant of Concern	Option	Model Effluent Concentration (mg/L)
Conventional and Classic Pollutants		
Total suspended solids (TSS)	BAT-1, PSES-1	12.3
Hexane extractable material (HEM)	BAT-1, PSES-1	6.56
Silica gel treated hexane extractable material (SGT-HEM)	BAT-1, PSES-1	5.69
Ammonia-N	BAT-1, PSES-1	0.615
Chemical oxygen demand (COD)	BAT-1, PSES-1	36.5
Fluoride	BAT-1, PSES-1	1.33
Nonconventional Metals		
Iron	BAT-1, PSES-1	2.45
Manganese	BAT-1, PSES-1	0.0308
Molybdenum	BAT-1, PSES-1	0.0890
Priority Metals		
Lead	BAT-1, PSES-1	0.0120
Zinc	BAT-1, PSES-1	0.0874

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-22

Proposed Arithmetic Long-Term Averages for the Integrated and Stand-Alone Hot Forming Subcategory Stainless Steel Segment

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Conventional and Classic Pollutants		
Total suspended solids (TSS)	BAT-1, PSES-1	7.14
Hexane extractable material (HEM)	BAT-1, PSES-1	8.78
Silica gel treated hexane extractable material (SGT-HEM)	BAT-1, PSES-1	7.13
Chemical oxygen demand (COD)	BAT-1, PSES-1	44.6
Total organic carbon (TOC)	BAT-1, PSES-1	11.2
Fluoride	BAT-1, PSES-1	14.9
Nonconventional Metals		
Iron	BAT-1, PSES-1	0.658
Manganese	BAT-1, PSES-1	0.0492
Molybdenum	BAT-1, PSES-1	1.23
Titanium	BAT-1, PSES-1	0.009
Priority Metals		
Antimony	BAT-1, PSES-1	0.26
Chromium	BAT-1, PSES-1	0.0255
Copper	BAT-1, PSES-1	0.00904
Nickel	BAT-1, PSES-1	0.151
Zinc	BAT-1, PSES-1	0.071

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-23

Summary of Baseline and Post-Compliance Pollutant Loadings for the Integrated and Stand-Alone Hot Forming Subcategory Carbon and Alloy Steel Segment Direct Dischargers

Pollutant Group	Baseline Load (lbs/yr)	Treated Load Discharged to Surface Water (lbs/yr)
		BAT-1
Total conventionals	26,400,000	4,830,000
Total priority metals	73,200	8,610
Total nonconventional metals	5,760,000	625,000
Total nonconventional other	6,530,000	6,530,000
Chemical oxygen demand (COD)	60,200,000	6,930,000
Silica gel treated hexane extractable material (SGT-HEM)	5,690,000	840,000

Table 10-24

Summary of Baseline and Post-Compliance Pollutant Loadings for the Integrated and Stand-Alone Hot Forming Subcategory Stainless Steel Segment Direct Dischargers[a]

Pollutant Group	Baseline Load (lbs/yr)	Treated Load Discharged to Surface Water (lbs/yr)
		BAT-1
Chemical oxygen demand (COD)	0	0
Silica gel treated hexane extractable material (SGT-HEM)	0	0
Total nonconventional metals	0	0
Total nonconventional other	0	0
Total organic carbon (TOC)	0	0
Total priority metals	0	0

[a]In 1997, no sites with integrated or stand-alone hot forming operations discharged directly.

Table 10-25

Summary of Baseline and Post-Compliance Pollutant Loadings for the Integrated and Stand-Alone Hot Forming Subcategory Carbon and Alloy Steel Segment Indirect Dischargers[a]

		Treated Load Discharged from POTW (lbs/yr)
Pollutant Group	**Baseline Load (lbs/yr)**	**PSES-1**
Total priority and nonconventional pollutants	37,700	17,300

[a]Data are aggregated to protect confidential business information.

Table 10-26

Summary of Baseline and Post-Compliance Pollutant Loadings for the Integrated and Stand-Alone Hot Forming Subcategory Stainless Steel Segment Indirect Dischargers[a]

		Treated Load Discharged from POTW (lbs/yr)
Pollutant Group	**Baseline Load (lbs/yr)**	**PSES-1**
Total priority and nonconventional pollutants	1,380	449

[a]Data are aggregated to protect confidential business information.

Table 10-27

Summary of Pollutant Removals for the Integrated and Stand-Alone Hot Forming Subcategory Carbon and Alloy Steel Segment Direct Dischargers

Pollutant Group	Pollutant Removals (lbs/yr)
	BAT-1
Total conventionals	21,600,000
Total priority metals	64,600
Total nonconventional metals	5,140,000
Total nonconventional other	0
Chemical oxygen demand (COD)	53,300,000
Silica gel treated hexane extractable material (SGT-HEM)	4,850,000

Table 10-28

Summary of Pollutant Removals for the Integrated and Stand-Alone Hot Forming Subcategory Stainless Steel Segment Direct Dischargers[a]

Pollutant Group	Pollutant Removals (lbs/yr)
	BAT-1
Total conventionals	0
Total priority metals	0
Total nonconventional metals	0
Total nonconventional other	0
Chemical oxygen demand (COD)	0
Silica gel treated hexane extractable material (SGT-HEM)	0

[a]In 1997, no sites with integrated or stand-alone hot forming operations discharged directly.

Table 10-29

Summary of Pollutant Removals for the Integrated and Stand-Alone Hot Forming Subcategory Carbon and Alloy Steel Segment Indirect Dischargers[a]

Pollutant Group	Pollutant Removals (lbs/yr)
	PSES-1
Total priority and nonconventional pollutants	20,400

[a]Data are aggregated to protect confidential business information.

Table 10-30

Summary of Pollutant Removals for the Integrated and Stand-Alone Hot Forming Subcategory Stainless Steel Segment Indirect Dischargers[a]

Pollutant Group	Pollutant Removals, lbs/yr
	PSES-1
Total priority and nonconventional pollutants	930

[a]Data are aggregated to protect confidential business information.

Table 10-31

Average Baseline Pollutant Concentrations for the Non-Integrated Steelmaking and Hot Forming Subcategory Carbon and Alloy Steel Segment

Pollutant of Concern	Type of Discharge	Average Baseline Concentration (mg/L)
Conventional and Classic Pollutants		
Total suspended solids (TSS)	Direct	24.5
	Indirect	24.0
Ammonia-N	Direct	1
	Indirect	1
Hexane extractable material (HEM)	Direct	7.52
	Indirect	22.4
Silica gel treated hexane extractable material (SGT-HEM)	Direct	5.52
	Indirect	5.52
Chemical oxygen demand (COD)	Direct	24.5
	Indirect	61
Total organic carbon (TOC)	Direct	5
	Indirect	5
Nonconventional Metals		
Iron	Direct	2.35
	Indirect	2.14
Manganese	Direct	0.0670
	Indirect	0.0670
Priority Metals		
Lead	Direct	0.001
	Indirect	0.0275
Zinc	Direct	0.896
	Indirect	0.129

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-32

Average Baseline Pollutant Concentrations for the Non-Integrated Steelmaking and Hot Forming Subcategory Stainless Steel Segment

Pollutant of Concern	Type of Discharge	Average Baseline Concentration (mg/L)
Conventional and Classic Pollutants		
Total suspended solids (TSS)	Direct, Indirect	122
Hexane extractable material (HEM)	Direct, Indirect	56
Silica gel treated hexane extractable material (SGT-HEM)	Direct, Indirect	12.7
Ammonia-N	Direct, Indirect	1
Nitrate/nitrite	Direct, Indirect	0.132
Chemical oxygen demand (COD)	Direct, Indirect	306
Total organic carbon (TOC)	Direct, Indirect	75.6
Fluoride	Direct, Indirect	0.77
Nonconventional Metals		
Aluminum	Direct, Indirect	0.413
Boron	Direct, Indirect	0.691
Hexavalent chromium	Direct, Indirect	0.0165
Iron	Direct, Indirect	9.29
Manganese	Direct, Indirect	0.926
Molybdenum	Direct, Indirect	10.2
Titanium	Direct, Indirect	0.00603
Priority Metals		
Antimony	Direct, Indirect	0.0215
Chromium	Direct, Indirect	0.148
Copper	Direct, Indirect	0.15
Lead	Direct, Indirect	0.006
Nickel	Direct, Indirect	1.83
Total organic carbon (TOC)	Direct, Indirect	75.6
Zinc	Direct, Indirect	4.75

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-33

Proposed Arithmetic Long-Term Averages for the Non-Integrated Steelmaking and Hot Forming Subcategory Carbon and Alloy Steel Segment

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Conventional and Classic Pollutants		
Total suspended solids (TSS)	BAT-1, PSES-1	7.18
Hexane extractable material (HEM)	BAT-1, PSES-1	2.47
Silica gel treated hexane extractable material (SGT-HEM)	BAT-1, PSES-1	2.47
Ammonia-N	BAT-1, PSES-1	0.66
Chemical oxygen demand (COD)	BAT-1, PSES-1	57
Total organic carbon (TOC)	BAT-1, PSES-1	11
Nonconventional Metals		
Iron	BAT-1, PSES-1	1.3
Manganese	BAT-1, PSES-1	0.82
Priority Metals		
Lead	BAT-1, PSES-1	0.001
Zinc	BAT-1, PSES-1	0.0316

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-34

Proposed Arithmetic Long-Term Averages for the Non-Integrated Steelmaking and Hot Forming Subcategory Stainless Steel Segment

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Conventional and Classic Pollutants		
Total suspended solids (TSS)	BAT-1, PSES-1	6.36
	BAT-2	6.36
Hexane extractable material (HEM)	BAT-1, PSES-1	8.78
	BAT-2	6.04
Silica gel treated hexane extractable material (SGT-HEM)	BAT-1, PSES-1	7.13
	BAT-2	5.78
Ammonia-N	BAT-1, PSES-1	0.2
	BAT-2	0.2
Nitrate/nitrite	BAT-1, PSES-1	0.0571
	BAT-2	0.0571
Chemical oxygen demand (COD)	BAT-1, PSES-1	44.6
	BAT-2	44.6
Total organic carbon (TOC)	BAT-1, PSES-1	11.2
	BAT-2	11.2
Fluoride	BAT-1, PSES-1	14.9
	BAT-2	14.9
Nonconventional Metals		
Aluminum	BAT-1, PSES-1	0.109
	BAT-2	0.109
Boron	BAT-1, PSES-1	0.292
	BAT-2	0.292
Hexavalent chromium	BAT-1, PSES-1	0.0164
	BAT-2	0.0164
Iron	BAT-1, PSES-1	0.558
	BAT-2	0.558
Manganese	BAT-1, PSES-1	0.0492
	BAT-2	0.0492
Molybdenum	BAT-1, PSES-1	1.23
	BAT-2	1.23

Table 10-34 (Continued)

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Nonconventional Metals (continued)		
Titanium	BAT-1, PSES-1	0.009
	BAT-2	0.005
Priority Metals		
Antimony	BAT-1, PSES-1	0.255
	BAT-2	0.0170
Chromium	BAT-1, PSES-1	0.0255
	BAT-2	0.0255
Copper	BAT-1, PSES-1	0.00904
	BAT-2	0.00904
Lead	BAT-1, PSES-1	0.0143
	BAT-2	0.002
Nickel	BAT-1, PSES-1	0.151
	BAT-2	0.151
Zinc	BAT-1, PSES-1	0.0846
	BAT-2	0.0846

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-35

Summary of Baseline and Post-Compliance Pollutant Loadings for the Non-Integrated Steelmaking and Hot Forming Subcategory Carbon and Alloy Steel Segment Direct Dischargers

Pollutant Group	Baseline Load (lbs/yr)	Treated Load Discharged to Surface Water (lbs/yr)
		BAT-1
Chemical oxygen demand (COD)	3,690,000	353,000
Silica gel treated hexane extractable material (SGT-HEM)	531,000	37,000
Total conventionals	2,780,000	167,000
Total nonconventional metals	267,000	22,100
Total nonconventional other	99,500	99,500
Total organic carbon (TOC)	743,000	71,500
Total priority metals	102,000	2,630

Table 10-36

Summary of Baseline and Post-Compliance Pollutant Loadings for the Non-Integrated Steelmaking and Hot Forming Subcategory Stainless Steel Segment Direct Dischargers[a]

Pollutant Group	Baseline Load (lbs/yr)	Treated Load Discharged to surface Water (lbs/yr)	
		BAT-1	BAT-2
Total conventionals	18,200	79,300	79,300
Total priority and nonconventional pollutants	52,800	35,100	35,100

[a]Data are aggregated to protect confidential business information.

Table 10-37

Summary of Baseline and Post-Compliance Pollutant Loadings for the Non-Integrated Steelmaking and Hot Forming Subcategory Carbon and Alloy Steel Segment Indirect Dischargers[a]

Pollutant Group	Baseline Load (lbs/yr)	Treated Load Discharged from POTW (lbs/yr)
		PSES-1
Total priority and nonconventional pollutants	3,110	2,100

[a]Data are aggregated to protect confidential business information.

Table 10-38

Summary of Baseline and Post-Compliance Pollutant Loadings for the Non-Integrated Steelmaking and Hot Forming Subcategory Stainless Steel Segment Indirect Dischargers[a]

Pollutant Group	Baseline Load (lbs/yr)	Treated Load Discharged from POTW (lbs/yr)
		PSES-1
Total priority and nonconventional pollutants	13,900	2,300

[a]Data are aggregated to protect confidential business information.

Table 10-39

Summary of Pollutant Removals for the Non-Integrated Steelmaking and Hot Forming Subcategory Carbon and Alloy Steel Segment Direct Dischargers[a]

Pollutant Group	Pollutant Removals (lbs/yr)
	BAT-1
Total conventionals	2,610,000
Total priority metals	99,500
Total nonconventional metals	244,000
Total nonconventional other	0
Chemical oxygen demand (COD)	3,340,000
Total organic carbon (TOC)	671,000
Silica gel treated hexane extractable material (SGT-HEM)	494,000

Table 10-40

Summary of Pollutant Removals for the Non-Integrated Steelmaking and Hot Forming Subcategory Stainless Steel Segment Direct Dischargers[a]

Pollutant Group	Pollutant Removals (lbs/yr)	
	BAT-1	BAT-2
Total conventionals	103,000	103,000
Total priority and nonconventional pollutants	17,700	17,700

[a]Data are aggregated to protect confidential business information.

Table 10-41

Summary of Pollutant Removals for the Non-Integrated Steelmaking and Hot Forming Subcategory Carbon and Alloy Steel Segment Indirect Dischargers[a]

Pollutant Group	Pollutant Removals (lbs/yr)
	PSES-1
Total priority and nonconventional pollutants	1,010

[a]Data are aggregated to protect confidential business information.

Table 10-42

Summary of Pollutant Removals for the Non-Integrated Steelmaking and Hot Forming Subcategory Stainless Steel Segment Indirect Dischargers[a]

Pollutant Group	Pollutant Removals (lbs/yr)
	PSES-1
Total priority metals	11,600

[a]Data are aggregated to protect confidential business information.

Table 10-43

Average Baseline Pollutant Concentrations for the Steel Finishing Subcategory Carbon and Alloy Steel Segment

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Conventional and Classic Pollutants			
Total suspended solids (TSS)	Acid pickling	Direct	20.2
		Indirect	38.1
	Alkaline cleaning	Direct	19.8
		Indirect	48.7
	Annealing	Direct	27.9
		Indirect	27.9
	Cold forming	Direct	14.5
		Indirect	53.6
	Electroplating	Direct	8.18
		Indirect	31.7
	Hot Dip coating	Direct	6.49
		Indirect	6.49
Hexane extractable material (HEM)	Acid pickling	Direct	4.70
		Indirect	11.3
	Alkaline cleaning	Direct	17.8
		Indirect	17.8
	Annealing	Direct	7.89
		Indirect	7.89
	Cold forming	Direct	12.8
		Indirect	11.3
	Electroplating	Direct	4.7
		Indirect	5.59
	Hot dip coating	Direct	4.7
		Indirect	5.59
Silica gel treated hexane extractable material (SGT-HEM)	Acid pickling	Direct	4.7
		Indirect	6.03
	Alkaline cleaning	Direct	6
		Indirect	6
	Annealing	Direct	6.37
		Indirect	6.37

Table 10-43 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Conventional and Classic Pollutants (continued)			
Silica gel treated hexane extractable material (SGT-HEM) (cont.)	Cold forming	Direct	6
		Indirect	6.03
	Electroplating	Direct	4.7
		Indirect	5.59
	Hot dip coating	Direct	4.7
		Indirect	5.59
Ammonia-N	Acid pickling	Direct	0.912
		Indirect	1.4
	Alkaline cleaning	Direct	0.382
		Indirect	1.8
	Annealing	Direct	31.9
		Indirect	31.9
	Cold forming	Direct	0.382
		Indirect	1.4
	Electroplating	Direct	0.912
		Indirect	1.4
	Hot dip coating	Direct	5.85
		Indirect	5.85
Nitrate/nitrite	Acid pickling	Direct	0.214
		Indirect	0.0934
	Alkaline cleaning	Direct	1.3
		Indirect	1.3
	Annealing	Direct	710
		Indirect	710
	Cold forming	Direct	1.3
		Indirect	0.0934
	Electroplating	Direct	0.214
		Indirect	0.128
	Hot dip coating	Direct	3.04
		Indirect	3.04
Total Phenols	Acid pickling	Direct	0.144
		Indirect	0.389
	Alkaline cleaning	Direct	0.181
		Indirect	0.181
	Annealing	Direct	0.0525
		Indirect	0.0525

Table 10-43 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Conventional and Classic Pollutants (continued)			
Total Phenols (cont.)	Cold forming	Direct	0.150
		Indirect	0.389
	Electroplating	Direct	0.172
		Indirect	0.005
	Hot dip coating	Direct	0.191
		Indirect	0.191
Chemical oxygen demand (COD)	Acid pickling	Direct	39.9
		Indirect	211
	Alkaline cleaning	Direct	272
		Indirect	272
	Annealing	Direct	58.0
		Indirect	58.0
	Cold forming	Direct	272
		Indirect	211
	Electroplating	Direct	39.9
		Indirect	50.2
	Hot dip coating	Direct	39.9
		Indirect	50.2
Total organic carbon (TOC)	Acid pickling	Direct	10
		Indirect	65.6
	Alkaline cleaning	Direct	88
		Indirect	88
	Annealing	Direct	13.3
		Indirect	13.3
	Cold forming	Direct	88
		Indirect	65.6
	Electroplating	Direct	10
		Indirect	5.11
	Hot dip coating	Direct	10
		Indirect	5.11
Fluoride	Acid pickling	Direct	1.9
		Indirect	0.814
	Alkaline cleaning	Direct	1.74
		Indirect	1.74
	Annealing	Direct	136
		Indirect	258

Table 10-43 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Conventional and Classic Pollutants (continued)			
Fluoride (cont.)	Cold forming	Direct	1.74
		Indirect	0.814
	Electroplating	Direct	1.9
		Indirect	0.681
	Hot dip coating	Direct	1.9
		Indirect	0.681
Nonconventional Metals			
Aluminum	Acid pickling	Direct	0.16
		Indirect	1.67
	Alkaline cleaning	Direct	0.0738
		Indirect	0.0738
	Annealing	Direct	0.0738
		Indirect	0.0738
	Cold forming	Direct	0.0738
		Indirect	1.67
	Electroplating	Direct	0.16
		Indirect	0.031
	Hot dip coating	Direct	0.16
		Indirect	0.031
Boron	Acid pickling	Direct	0.0649
		Indirect	0.0577
	Alkaline cleaning	Direct	0.193
		Indirect	0.193
	Annealing	Direct	0.118
		Indirect	0.118
	Cold forming	Direct	0.193
		Indirect	0.0577
	Electroplating	Direct	0.0649
		Indirect	0.054
	Hot dip coating	Direct	0.0649
		Indirect	0.054
Hexavalent chromium	Acid pickling	Direct	0.0076
		Indirect	0.0978
	Alkaline cleaning	Direct	0.009
		Indirect	0.0978

Table 10-43 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Nonconventional Metals (continued)			
Hexavalent chromium (cont.)	Annealing	Direct	0.0298
		Indirect	0.0298
	Cold forming	Direct	0.0132
		Indirect	0.0978
	Electroplating	Direct	0.01
		Indirect	0.0978
	Hot dip coating	Direct	0.0112
		Indirect	0.0112
Iron	Acid pickling	Direct	0.912
		Indirect	2.08
	Alkaline cleaning	Direct	1.45
		Indirect	1.45
	Annealing	Direct	0.923
		Indirect	0.923
	Cold forming	Direct	1.36
		Indirect	2.08
	Electroplating	Direct	0.969
		Indirect	0.008
	Hot dip coating	Direct	0.628
		Indirect	0.628
Manganese	Acid pickling	Direct	0.0376
		Indirect	0.055
	Alkaline cleaning	Direct	0.17
		Indirect	0.17
	Annealing	Direct	0.252
		Indirect	0.252
	Cold forming	Direct	0.17
		Indirect	0.055
	Electroplating	Direct	0.0376
		Indirect	0.0121
	Hot dip coating	Direct	0.0376
		Indirect	0.0121

Table 10-43 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Nonconventional Metals (continued)			
Molybdenum	Acid pickling	Direct	0.0308
		Indirect	0.0356
	Alkaline cleaning	Direct	0.0552
		Indirect	0.0572
	Annealing	Direct	0.149
		Indirect	0.149
	Cold forming	Direct	0.0552
		Indirect	0.0356
	Electroplating	Direct	0.0308
		Indirect	0.0454
	Hot dip coating	Direct	0.0308
		Indirect	0.0483
Tin	Acid pickling	Direct	0.00213
		Indirect	0.002
	Alkaline cleaning	Direct	0.00204
		Indirect	0.00204
	Annealing	Direct	0.0036
		Indirect	0.0036
	Cold forming	Direct	0.0298
		Indirect	0.002
	Electroplating	Direct	0.0299
		Indirect	0.22
	Hot dip coating	Direct	0.0299
		Indirect	0.22
Titanium	Acid pickling	Direct	0.00481
		Indirect	0.00437
	Alkaline cleaning	Direct	0.004
		Indirect	0.004
	Annealing	Direct	0.0046
		Indirect	0.0046
	Cold forming	Direct	0.004
		Indirect	0.00437
	Electroplating	Direct	0.00481
		Indirect	0.00301
	Hot dip coating	Direct	0.00481
		Indirect	0.00301

Table 10-43 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Priority Metals			
Antimony	Acid pickling	Direct	0.0495
		Indirect	0.0134
	Alkaline cleaning	Direct	0.00952
		Indirect	0.00952
	Annealing	Direct	0.0179
		Indirect	0.0179
	Cold forming	Direct	0.0479
		Indirect	0.0134
	Electroplating	Direct	0.0495
		Indirect	0.0218
	Hot dip coating	Direct	0.0495
		Indirect	0.0218
Arsenic	Acid pickling	Direct	0.00192
		Indirect	0.00362
	Alkaline cleaning	Direct	0.00126
		Indirect	0.00514
	Annealing	Direct	0.00145
		Indirect	0.015
	Cold forming	Direct	0.00126
		Indirect	0.00362
	Electroplating	Direct	0.00192
		Indirect	0.0138
	Hot dip coating	Direct	0.00192
		Indirect	0.0138
Chromium	Acid pickling	Direct	0.12
		Indirect	0.167
	Alkaline cleaning	Direct	0.125
		Indirect	0.222
	Annealing	Direct	0.122
		Indirect	0.1
	Cold forming	Direct	0.0844
		Indirect	0.0774
	Electroplating	Direct	0.0811
		Indirect	0.049
	Hot dip coating	Direct	0.0973
		Indirect	0.06

Table 10-43 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Priority Metals(continued)			
Copper	Acid pickling	Direct	0.0110
		Indirect	0.0276
	Alkaline cleaning	Direct	0.0137
		Indirect	0.0178
	Annealing	Direct	0.0258
		Indirect	0.005
	Cold forming	Direct	0.0137
		Indirect	0.0396
	Electroplating	Direct	0.0102
		Indirect	0.115
	Hot dip coating	Direct	0.01
		Indirect	0.06
Lead	Acid pickling	Direct	0.00452
		Indirect	0.0371
	Alkaline cleaning	Direct	0.00791
		Indirect	0.0547
	Annealing	Direct	0.002
		Indirect	0.01
	Cold forming	Direct	0.0126
		Indirect	0.0625
	Electroplating	Direct	0.00663
		Indirect	0.0106
	Hot dip coating	Direct	0.0155
		Indirect	0.18
Nickel	Acid pickling	Direct	0.133
		Indirect	0.117
	Alkaline cleaning	Direct	0.0293
		Indirect	0.0951
	Annealing	Direct	0.208
		Indirect	0.63
	Cold forming	Direct	0.017
		Indirect	0.102
	Electroplating	Direct	0.0280
		Indirect	0.128
	Hot dip coating	Direct	0.0159
		Indirect	0.08

Table 10-43 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Priority Metals (continued)			
Zinc	Acid pickling	Direct	0.136
		Indirect	0.0523
	Alkaline cleaning	Direct	0.0961
		Indirect	0.0659
	Annealing	Direct	0.00894
		Indirect	0.0120
	Cold forming	Direct	0.127
		Indirect	0.277
	Electroplating	Direct	0.209
		Indirect	0.0875
	Hot dip coating	Direct	0.0589
		Indirect	0.635
Nonconventional Organic Constituents			
2-Propanone	Acid pickling	Direct	0.0632
		Indirect	0.176
	Alkaline cleaning	Direct	0.451
		Indirect	0.451
	Annealing	Direct	0.0503
		Indirect	0.0503
	Cold forming	Direct	0.451
		Indirect	0.176
	Electroplating	Direct	0.0632
		Indirect	0.04
	Hot dip coating	Direct	0.0632
		Indirect	0.04
Alpha-Terpineol	Acid pickling	Direct	0.01
		Indirect	0.0192
	Alkaline cleaning	Direct	0.0762
		Indirect	0.0762
	Annealing	Direct	0.01
		Indirect	0.01
	Cold forming	Direct	0.0762
		Indirect	0.0192

Table 10-43 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Nonconventional Organic Constituents (continued)			
Alpha-Terpineol (cont.)	Electroplating	Direct	0.01
		Indirect	0.0608
	Hot dip coating	Direct	0.01
		Indirect	0.0608
n-Dodecane	Acid pickling	Direct	0.01
		Indirect	0.0169
	Alkaline cleaning	Direct	0.01
		Indirect	0.01
	Annealing	Direct	0.01
		Indirect	0.01
	Cold forming	Direct	0.01
		Indirect	0.0169
	Electroplating	Direct	0.01
		Indirect	0.0608
	Hot dip coating	Direct	0.01
		Indirect	0.0608
n-Hexadecane	Acid pickling	Direct	0.01
		Indirect	0.01
	Alkaline cleaning	Direct	0.01
		Indirect	0.01
	Annealing	Direct	0.01
		Indirect	0.01
	Cold forming	Direct	0.01
		Indirect	0.01
n-Hexadecane (cont.)	Electroplating	Direct	0.01
		Indirect	0.0608
	Hot dip coating	Direct	0.01
		Indirect	0.0608

Table 10-43 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Priority Organic Constituents			
Bis(2-ethylhexyl) phthalate	Acid pickling	Direct	0.01
		Indirect	0.0178
	Alkaline cleaning	Direct	0.01
		Indirect	0.01
	Annealing	Direct	0.0158
		Indirect	0.0158
	Cold forming	Direct	0.01
		Indirect	0.0178
	Electroplating	Direct	0.01
		Indirect	0.0354
	Hot dip coating	Direct	0.01
		Indirect	0.0354

[a]Acid pickling includes hydrochloric acid strip, sulfuric acid strip, sulfuric acid bar, sulfuric acid pipe and tube, other acid strip, other acid bar, and other acid pipe and tube. Alkaline cleaning includes bar, strip or coil, and pipe and tube. Cold forming includes recirculation single-stand, recirculation multi-stand, combination, direct application single-stand, and direct application multi-stand. Electroplating includes tin and chrome, other metals, and other plating.

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-44

Average Baseline Pollutant Concentrations for the Steel Finishing Subcategory Stainless Steel Segment

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Conventional and Classic Pollutants			
Total suspended solids (TSS)	Acid pickling	Direct	14.6
		Indirect	22.4
	Alkaline cleaning	Direct	2.77
		Indirect	2.77
	Annealing	Direct	27.9
		Indirect	27.9
	Cold forming	Direct	33
		Indirect	33
Hexane extractable material (HEM)	Acid pickling	Direct	7.33
		Indirect	7.33
	Alkaline cleaning	Direct	17.8
		Indirect	17.8
	Annealing	Direct	7.89
		Indirect	7.89
	Cold forming	Direct	7.85
		Indirect	7.85
Silica gel treated hexane extractable material (SGT-HEM)	Acid pickling	Direct	6.20
		Indirect	6.20
	Alkaline cleaning	Direct	6
		Indirect	6
	Annealing	Direct	6.37
		Indirect	6.37
	Cold forming	Direct	6.5
		Indirect	6.5
Ammonia-N	Acid pickling	Direct	17.1
		Indirect	17.1
	Alkaline cleaning	Direct	0.382
		Indirect	1.8
	Annealing	Direct	31.9
		Indirect	31.9

Table 10-44 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Conventional and Classic Pollutants (continued)			
Ammonia-N (cont.)	Cold forming	Direct	22.5
		Indirect	22.5
Nitrate/nitrite	Acid pickling	Direct	506
		Indirect	506
	Alkaline cleaning	Direct	1.3
		Indirect	1.3
	Annealing	Direct	710
		Indirect	710
	Cold forming	Direct	519
		Indirect	519
Total cyanide	Acid pickling	Direct	2.36
		Indirect	2.36
	Alkaline cleaning	Direct	0.04
		Indirect	0.0360
	Annealing	Direct	2.36
		Indirect	2.36
	Cold forming	Direct	0.0300
		Indirect	0.0300
Total phenols	Acid pickling	Direct	0.0517
		Indirect	0.0517
	Alkaline cleaning	Direct	0.181
		Indirect	0.181
	Annealing	Direct	0.0525
		Indirect	0.0525
	Cold forming	Direct	0.05
		Indirect	0.05
Chemical oxygen demand (COD)	Acid pickling	Direct	44.3
		Indirect	44.3
	Alkaline cleaning	Direct	272
		Indirect	272
	Annealing	Direct	58.0
		Indirect	58.0
	Cold forming	Direct	85.6
		Indirect	85.6

Table 10-44 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Conventional and Classic Pollutants (continued)			
Total organic carbon (TOC)	Acid pickling	Direct	10.2
		Indirect	10.2
	Alkaline cleaning	Direct	88
		Indirect	88
	Annealing	Direct	13.3
		Indirect	13.3
	Cold forming	Direct	16.6
		Indirect	16.6
Fluoride	Acid pickling	Direct	75.1
		Indirect	258
	Alkaline cleaning	Direct	11.3
		Indirect	11.3
	Annealing	Direct	136
		Indirect	258
	Cold forming	Direct	6.96
		Indirect	6.96
Nonconventional Metals			
Aluminum	Acid pickling	Direct	0.0730
		Indirect	0.0730
	Alkaline cleaning	Direct	0.0738
		Indirect	0.0738
	Annealing	Direct	0.0738
		Indirect	0.0738
	Cold forming	Direct	0.0916
		Indirect	0.0916
Barium	Acid pickling	Direct	0.0179
		Indirect	0.0179
	Alkaline cleaning	Direct	0.211
		Indirect	0.211
	Annealing	Direct	0.0228
		Indirect	0.0228
	Cold forming	Direct	0.0239
		Indirect	0.0239

Table 10-44 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Nonconventional Metals (continued)			
Boron	Acid pickling	Direct	0.142
		Indirect	0.142
	Alkaline cleaning	Direct	0.193
		Indirect	0.193
	Annealing	Direct	0.118
		Indirect	0.118
	Cold forming	Direct	0.0585
		Indirect	0.0585
Cobalt	Acid pickling	Direct	0.0114
		Indirect	0.0114
	Alkaline cleaning	Direct	0.009
		Indirect	0.009
	Annealing	Direct	0.0112
		Indirect	0.0112
	Cold forming	Direct	0.012
		Indirect	0.012
Hexavalent chromium	Acid pickling	Direct	0.0397
		Indirect	0.0397
	Alkaline cleaning	Direct	0.01
		Indirect	0.01
	Annealing	Direct	0.0298
		Indirect	0.0298
	Cold forming	Direct	0.0085
		Indirect	0.0085
Iron	Acid pickling	Direct	0.486
		Indirect	2.79
	Alkaline cleaning	Direct	0.0377
		Indirect	0.0377
	Annealing	Direct	0.923
		Indirect	0.923
	Cold forming	Direct	0.736
		Indirect	0.736

Table 10-44 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Nonconventional Metals (continued)			
Magnesium	Acid pickling	Direct	21.7
		Indirect	21.7
	Alkaline cleaning	Direct	10.7
		Indirect	10.7
	Annealing	Direct	31.9
		Indirect	31.9
	Cold forming	Direct	43
		Indirect	43
Manganese	Acid pickling	Direct	0.168
		Indirect	0.0387
	Alkaline cleaning	Direct	0.17
		Indirect	0.17
	Annealing	Direct	0.252
		Indirect	0.252
	Cold forming	Direct	0.261
		Indirect	0.261
Molybdenum	Acid pickling	Direct	0.449
		Indirect	0.449
	Alkaline cleaning	Direct	0.0552
		Indirect	0.0572
	Annealing	Direct	0.149
		Indirect	0.149
	Cold forming	Direct	0.168
		Indirect	0.168
Tin	Acid pickling	Direct	0.0034
		Indirect	0.0034
	Alkaline cleaning	Direct	0.00204
		Indirect	0.00204
	Annealing	Direct	0.0036
		Indirect	0.0036
	Cold forming	Direct	0.004
		Indirect	0.004

Table 10-44 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Nonconventional Metals (continued)			
Titanium	Acid pickling	Direct	0.0044
		Indirect	0.0044
	Alkaline cleaning	Direct	0.004
		Indirect	0.004
	Annealing	Direct	0.0046
		Indirect	0.0046
	Cold forming	Direct	0.005
		Indirect	0.005
Priority Metals			
Antimony	Acid pickling	Direct	0.0140
		Indirect	0.0140
	Alkaline cleaning	Direct	0.00952
		Indirect	0.00952
	Annealing	Direct	0.0179
		Indirect	0.0179
	Cold forming	Direct	0.0168
		Indirect	0.0168
Arsenic	Acid pickling	Direct	0.00152
		Indirect	0.015
	Alkaline cleaning	Direct	0.00126
		Indirect	0.00514
	Annealing	Direct	0.00145
		Indirect	0.015
	Cold forming	Direct	0.00188
		Indirect	0.00188
Chromium	Acid pickling	Direct	0.0903
		Indirect	0.0765
	Alkaline cleaning	Direct	0.0223
		Indirect	0.0223
	Annealing	Direct	0.122
		Indirect	0.1
	Cold forming	Direct	0.0673
		Indirect	0.0673

Table 10-44 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Priority Metals (continued)			
Copper	Acid pickling	Direct	0.0224
		Indirect	0.0129
	Alkaline cleaning	Direct	0.0191
		Indirect	0.0191
	Annealing	Direct	0.0258
		Indirect	0.005
	Cold forming	Direct	0.0236
		Indirect	0.0236
Lead	Acid pickling	Direct	0.00722
		Indirect	0.0553
	Alkaline cleaning	Direct	0.0051
		Indirect	0.0051
	Annealing	Direct	0.002
		Indirect	0.01
	Cold forming	Direct	0.0135
		Indirect	0.0135
Nickel	Acid pickling	Direct	0.122
		Indirect	0.339
	Alkaline cleaning	Direct	0.184
		Indirect	0.184
	Annealing	Direct	0.208
		Indirect	0.63
	Cold forming	Direct	0.158
		Indirect	0.158
Zinc	Acid pickling	Direct	0.0135
		Indirect	0.0347
	Alkaline cleaning	Direct	0.0296
		Indirect	0.0296
	Annealing	Direct	0.00894
		Indirect	0.0120
	Cold forming	Direct	0.009
		Indirect	0.009

Table 10-44 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Nonconventional Organic Constituents			
2-Propanone	Acid pickling	Direct	0.0502
		Indirect	0.0502
	Alkaline cleaning	Direct	0.451
		Indirect	0.451
	Annealing	Direct	0.0503
		Indirect	0.0503
	Cold forming	Direct	0.0505
		Indirect	0.0505
Hexanoic acid	Acid pickling	Direct	0.015
		Indirect	0.015
	Alkaline cleaning	Direct	0.01
		Indirect	0.01
	Annealing	Direct	0.01
		Indirect	0.01
	Cold forming	Direct	0.01
		Indirect	0.01
n-Dodecane	Acid pickling	Direct	0.0189
		Indirect	0.0189
	Alkaline cleaning	Direct	0.01
		Indirect	0.01
	Annealing	Direct	0.01
		Indirect	0.01
	Cold forming	Direct	0.01
		Indirect	0.01

Table 10-44 (Continued)

Pollutant of Concern	Type of Operation[a]	Type of Discharge	Average Baseline Concentration (mg/L)
Nonconventional Organic Constituents (continued)			
n-Hexadecane	Acid pickling	Direct	0.0258
		Indirect	0.0258
	Alkaline cleaning	Direct	0.01
		Indirect	0.01
	Annealing	Direct	0.01
		Indirect	0.01
	Cold forming	Direct	0.01
		Indirect	0.01

[a]Acid pickling includes strip, bar, and plate. Alkaline cleaning includes bar, strip or coil, and pipe and tube. Cold forming includes recirculation single-stand, recirculation multi-stand, combination, direct application single-stand, and direct application multi-stand.

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-45

Proposed Arithmetic Long-Term Averages for the Steel Finishing Subcategory Carbon and Alloy Steel Segment

Pollutant of Concern	Type of Operation[a]	Option	Arithmetic Long-Term Average (mg/L)
Conventional and Classic Pollutants			
Total suspended solids (TSS)	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	6.97
Hexane extractable material (HEM)	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	6.33
Hexane extractable material (SGT-HEM)	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	6.33
Ammonia-N	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.34
Nitrate/nitrite	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0623
Total phenols	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0820
Chemical oxygen demand (COD)	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	61.3
Total organic carbon (TOC)	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	10.9
Fluoride	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.349
Nonconventional Metals			
Aluminum	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0945
Boron	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0433
Hexavalent chromium	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0109
Iron	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.558
Manganese	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0387
Molybdenum	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.00617
Tin	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0124

Table 10-45 (Continued)

Pollutant of Concern	Type of Operation[a]	Option	Arithmetic Long-Term Average (mg/L)
Nonconventional Metals (continued)			
Titanium	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0045
Priority Metals			
Antimony	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0147
Arsenic	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0019
Chromium	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0387
Copper	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.00883
Lead	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0175
Nickel	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0362
Zinc	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0425
Nonconventional Organic Constituents			
2-Propanone	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.052
Alpha-Terpineol	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.01
n-Dodecane	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0119
n-Hexadecane	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.0128
Priority Organic Constituents			
Bis(2-Ethylhexyl) phthalate	Acid pickling, alkaline cleaning, annealing, cold forming, electroplating, and hot dip coating	BAT-1, PSES-1	0.01

[a]Acid pickling includes hydrochloric acid strip, sulfuric acid strip, sulfuric acid bar, sulfuric acid pipe and tube, other acid strip, other acid bar, and other acid pipe and tube. Alkaline cleaning includes bar, strip or coil, and pipe and tube. Cold forming includes recirculation single-stand, recirculation multi-stand, combination, direct application single-stand, and direct application multi-stand. Electroplating includes tin and chrome, other metals, and other plating.

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-46

Proposed Arithmetic Long-Term Averages for the Steel Finishing Subcategory Stainless Steel Segment

Pollutant of Concern	Type of Operation[a]	Option	Arithmetic Long-Term Average (mg/L)
Conventional and Classic Pollutants			
Total suspended solids (TSS)	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	3.42
Hexane extractable material (HEM)	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	6.35
Silica gel treated hexane extractable material (SGT-HEM)	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	5.89
Ammonia-N	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	11.6
Nitrate/nitrite	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	93.9
Total cyanide	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.0160
Total phenols	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.05
Chemical oxygen demand (COD)	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	14.4
Total organic carbon (TOC)	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	3.43
Fluoride	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	16.6
Nonconventional Metals			
Aluminum	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.0763
Barium	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.00833
Boron	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.151
Cobalt	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.012
Hexavalent chromium	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.0816
Iron	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.0693

Table 10-46 (Continued)

Pollutant of Concern	Type of Operation[a]	Option	Arithmetic Long-Term Average (mg/L)
Nonconventional Metals (continued)			
Magnesium	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	1.32
Manganese	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.001
Molybdenum	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	1.03
Tin	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.003
Titanium	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.004
Priority Metals			
Antimony	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.00691
Arsenic	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.00173
Chromium	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.110
Copper	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.0231
Lead	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.0025
Nickel	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.0444
Zinc	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.00474
Nonconventional Organic Constituents			
2-Propanone	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.05
Hexanoic acid	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.028
n-Dodecane	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.0421
n-Hexadecane	Acid pickling, alkaline cleaning, annealing, and cold forming	BAT-1, PSES-1	0.0669

(a) Acid pickling includes strip, bar, and plate. Alkaline cleaning includes bar, strip or coil, and pipe and tube. Cold forming includes recirculation single-stand, recirculation multi-stand, combination, direct application single-stand, and direct application multi-stand.

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-47

Summary of Baseline and Post-Compliance Pollutant Loadings for the Steel Finishing Subcategory Carbon and Alloy Steel Segment Direct Dischargers

Pollutant Group	Baseline Load (lbs/yr)	Treated Load Discharged to Surface Water (lbs/yr)
		BAT-1
Chemical oxygen demand (COD)	27,200,000	10,400,000
Hexavalent chromium[a]	2,690	1,080
Silica gel treated hexane extractable material (SGT-HEM)	1,300,000	540,000
Total conventionals	4,560,000	1,760,000
Total nonconventional metals	310,000	115,000
Total nonconventional organic constituents	57,300	57,300
Total nonconventional other	1,240,000	1,240,000
Total phenols	36,700	36,700
Total organic carbon (TOC)	8,060,000	3,010,000
Total priority metals	78,900	29,600
Total priority organic constituents	2,430	2,430

[a]Hexavalent chromium was not included in the total nonconventional metals or the total priority metals, because total chromium is included in these totals.

Table 10-48

Summary of Baseline and Post-Compliance Pollutant Loadings for the Steel Finishing Subcategory Stainless Steel Segment Direct Dischargers[a]

		Treated Load Discharged to Surface Water (lbs/yr)
Pollutant Group	**Baseline Load (lbs/yr)**	**BAT-1**
Total conventionals	1,220,000	496,000
Total priority and nonconventional pollutants	30,900,000	16,700,000

[a]Data are aggregated to protect confidential business information.

Table 10-49

Summary of Baseline and Post-Compliance Pollutant Loadings for the Steel Finishing Subcategory Carbon and Alloy Steel Segment Indirect Dischargers

		Treated Load Discharged from POTW (lbs/yr)
Pollutant Group	**Baseline Load (lbs/yr)**	**PSES-1**
Chemical oxygen demand (COD)	169,000	90,970
Hexavalent chromium[a]	591	325
Silica gel treated-HEM (SGT-HEM)	6,680	4,600
Total nonconventional metals	2,970	1,640
Total nonconventional organic constituents	475	475
Total nonconventional other	12,200	12,200
Total phenols	296	296
Total organic carbon (TOC)	65,680	29,900
Total priority metals	1,010	664
Total priority organic constituents	92.0	92.0

[a]Hexavalent chromium was not included in the total nonconventional metals or the total priority metals, because total chromium is included in these totals.

Table 10-50

Summary of Baseline and Post-Compliance Pollutant Loadings for the Steel Finishing Subcategory Stainless Steel Segment Indirect Dischargers[a]

Pollutant Group	Baseline Load (lbs/yr)	Treated Load Discharged from POTW (lbs/yr)
		BAT-1
Total priority and nonconventional pollutants	304,000	274,.000

[a]Data are aggregated to protect confidential business information.

Table 10-51

Summary of Pollutant Removals for the Steel Finishing Subcategory Carbon and Alloy Steel Segment Direct Dischargers

Pollutant Group	Pollutant Removals (lbs/yr)
	BAT-1
Total conventionals	2,800,000
Total priority metals	49,300
Total nonconventional metals	195,000
Total nonconventional organic constituents	0
Total priority organic constituents	0
Total nonconventional other	0
Chemical oxygen demand (COD)	16,800,000
Total phenols	0
Total organic carbon (TOC)	5,050,000
Silica gel treated hexane extractable material (SGT-HEM)	764,000
Hexavalent chromium[a]	1,610

[a]Hexavalent chromium was not included in the total nonconventional metals or the total priority metals, because total chromium is included in these totals.

Table 10-52

Summary of Pollutant Removals for the Steel Finishing Subcategory Stainless Steel Segment Direct Dischargers[a]

Pollutant Group	Pollutant Removals (lbs/yr)
	BAT-1
Total conventionals	719,000
Total priority and nonconventional pollutants	14,200,000

[a]Data are aggregated to protect confidential business information.

Table 10-53

Summary of Pollutant Removals for the Steel Finishing Subcategory Carbon and Alloy Steel Segment Indirect Dischargers

Pollutant Group	Pollutant Removals (lbs/yr)
	PSES-1
Total priority metals	345
Total nonconventional metals	1,330
Total nonconventional organic constituents	0
Total priority organic constituents	0
Total nonconventional other	0
Chemical oxygen demand (COD)	78,200
Total phenols	0
Total organic carbon (TOC)	35,700
Silica gel treated hexane extractable material (SGT-HEM)	2,080
Hexavalent chromium[a]	265

[a]Hexavalent chromium was not included in the total nonconventional metals or the total priority metals, because total chromium is included in these totals.

Table 10-54

Summary of Pollutant Removals for the Steel Finishing Subcategory Stainless Steel Segment Indirect Dischargers[a]

Pollutant Group	Pollutant Removals (lbs/yr)
	PSES-1
Total priority and nonconventional pollutants	31,000

[a]Data are aggregated to protect confidential business information.

Table 10-55

Average Baseline Pollutant Concentrations for the Other Operations Subcategory Forging Segment

Pollutant of Concern	Type of Discharge	Average Baseline Concentration (mg/L)
Hexane extractable material (HEM)	Direct, Indirect	8

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-56

Proposed Arithmetic Long-Term Averages for the Other Operations Subcategory DRI Segment

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Aluminum	BPT	0.0403
Iron	BPT	2.40
Total suspended solids (TSS)	BPT	10.3

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-57

Proposed Arithmetic Long-Term Averages for the Other Operations Subcategory Forging Segment

Pollutant of Concern	Option	Arithmetic Long-Term Average (mg/L)
Hexane extractable material	BPT	6.56

Sources: U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Data (Detailed and Short Surveys), U.S. EPA Analytical and Production Data Follow-Up to the Collection of 1997 Iron and Steel Industry Data (Analytical and Production Survey), and U.S. EPA Iron and Steel Industry Wastewater Sampling Program, 1997-1999.

Table 10-58

Summary of Baseline and Post-Compliance Pollutant Loadings for the Other Operations Subcategory Forging Segment Direct Dischargers

Pollutant Group	Baseline Load (lbs/yr)	Treated Load Discharged to Surface Water (lbs/yr)
		BPT
Hexane extractable material (HEM)	1,100	652

Table 10-59
Summary of Pollutant Removals for the Other Operations Subcategory Forging Segment Direct Dischargers

Pollutant Group	Pollutant Removals (lbs/yr)
	BPT
Hexane extractable material (HEM)	444

SECTION 11

REGULATED POLLUTANTS

This section describes the selection of regulated pollutants for each subcategory at each statutory level (i.e., Best Practicable Control Technology Currently Available (BPT), Best Control Technology for Conventional Pollutants (BCT), Best Available Technology Economically Achievable (BAT), Pretreatment Standards for New Sources (PSNS), Pretreatment Standards for Existing Sources (PSES), and New Source Performance Standards (NSPS)). Regulated pollutants are pollutants for which EPA proposes to establish numerical effluent limitations and standards. EPA selected pollutants for regulation based on the following factors: applicable Clean Water Act provisions regarding the pollutants subject to each statutory level, the pollutants of concern (POCs) identified for each subcategory and segment, and co-treatment of compatible wastewater from different manufacturing operations. This section presents the following information:

- Section 11.1 presents EPA's methodology for selecting regulated pollutants for direct dischargers (those subject to BPT, BAT, or NSPS);
- Sections 11.2 through 11.8 discuss the regulated pollutants selected for direct dischargers for each proposed subcategory;
- Section 11.9 presents EPA's methodology for selecting regulated pollutants for indirect dischargers (those subject to PSES or PSNS); and
- Sections 11.10 through 11.16 discuss the regulated pollutants selected for indirect dischargers for each proposed subcategory.

11.1 Regulated Pollutant Selection Methodology for Direct Dischargers

The list of POCs for each subcategory represents those pollutants that are present at treatable concentrations in a significant percentage of untreated wastewater from that subcategory; Section 7 discusses the selection of POCs for each subcategory. Effluent monitoring for all POCs is not necessary to ensure that iron and steel wastewater pollution is adequately controlled, since many of the pollutants originate from similar sources, have similar treatabilities, are removed by similar mechanisms, and are treated to similar concentrations. Therefore, it may be sufficient to monitor for one pollutant as a surrogate or indicator of several others. From the POC list for each subcategory, EPA selected a subset of pollutants considered for regulation (DCN IS05070 in Section 5.4 of the Iron and Steel Administrative Proposal Record). Factors EPA considered in selecting pollutants considered for regulation from the list of POCs for each subcategory include the following:

- The pollutant was detected in the untreated wastewater at the BAT facility(ies) at treatable levels in a significant number of samples. EPA eliminated pollutants that were not detected at greater than 10 times the minimum level in at least 10 percent of the untreated wastewater samples from the BAT facility(ies).

- The pollutant is not used as a treatment chemical in the selected treatment technology option. EPA excluded all pollutants that may serve as treatment chemicals: aluminum, boron, iron, magnesium, manganese, and sulfate (several other pollutants are commonly used as treatment chemicals but were already excluded as POCs). EPA eliminated these pollutants because regulating these pollutants could interfere with their beneficial use as wastewater treatment additives.

- The pollutant is not considered a nonconventional bulk parameter. EPA excluded many nonconventional bulk parameters (e.g., chemical oxygen demand (COD), total Kjeldahl nitrogen (TKN), total organic carbon (TOC), nitrate/nitrite, total petroleum hydrocarbons (TPH), total phenols) because it determined it is more appropriate to target specific compounds of interest rather than a parameter that measures a variety of pollutants for this industry. The specific pollutants that comprise the bulk parameter may or may not be of concern to EPA.

- The pollutant is not considered to be volatile. Volatile pollutants are likely to be volatilized in the treatment system and are therefore not considered to be treated by the selected technology. For purposes of this evaluation, a pollutant was considered to be volatile if its Henry's Law Constant is greater than 10^{-4} atm·m^3/mol. If EPA could not obtain a Henry's Law Constant for a particular pollutant, it assumed the pollutant was not volatile.

- The pollutant is effectively treated by the selected treatment technology option. EPA excluded all pollutants for which the selected treatment option was ineffective (i.e., pollutant concentrations remained the same or increased across the treatment system).

From the list of pollutants considered for regulation, EPA determined the pollutants to regulate. Generally, EPA selected at least one pollutant from each pollutant group considered for regulation to ensure control of all remaining POCs in the pollutant group. For example, when one or more metals is proposed for regulation for a chemical precipitation system, EPA presumes that controlling those metals will control all other metals considered for regulation. The Agency did not propose for regulation POCs considered for regulation, but for which the model treatment technology was not designed or intended to treat (e.g., chemical precipitation systems are not designed to treat organic constituents, so EPA did not select organic constituents for regulation at options using only chemical precipitation).

The Clean Water Act establishes three classes of pollutants (conventional, nonconventional, and priority) and dictates which classes of pollutants EPA may regulate at each statutory level for direct dischargers.

- BPT - Conventional, nonconventional, and priority pollutants;
- BCT - Conventional pollutants;
- BAT - Nonconventional and priority pollutants; and
- NSPS - Conventional, nonconventional, and priority pollutants.

Section 14 presents the technology options proposed for each statutory level. As discussed in Section 14, EPA is not proposing to revise BPT limitations for those manufacturing processes currently subject to BPT limitations at 40 CFR Part 420; EPA is only proposing BPT limitations for those manufacturing processes in the Other Operations Subcategory, as these processes are not currently regulated under Part 420. In addition, EPA did not identify any technologies that better removed conventionals than BPT and at the same time passed the cost-effectiveness test; therefore, EPA proposes that BCT limitations be set equal to BPT limitations for every subcategory. Sections 11.2 through 11.8 discuss the selection of pollutants proposed for regulation for direct dischargers on a subcategory basis.

11.2 Cokemaking Subcategory

EPA selected proposed regulated pollutants for the By-Product Recovery Segment of the Cokemaking Subcategory only; EPA proposes zero discharge of pollutants from the Non-Recovery Segment. Table 11-1 lists pollutants proposed for regulation for this subcategory. The rationale for the selection of regulated pollutants for direct dischargers under this subcategory is presented below.

BAT

For this subcategory, EPA proposes establishing BAT limitations for ammonia as nitrogen, total cyanide, phenol, benzo(a)pyrene, naphthalene, thiocyanate, mercury, selenium, and total residual chlorine (TRC). Except for TRC, these pollutants are characteristic of cokemaking wastewater. TRC is an indicator of post-alkaline chlorination residual chlorine concentration. Facilities would not need to meet the TRC limit if they certify to the permitting authority that they do not use alkaline chlorination in their wastewater treatment. These proposed regulated pollutants are key indicators of the performance of the ammonia distillation, biological treatment, and alkaline chlorination processes, which are the key components of the model BAT and NSPS treatment systems for by-product coke plants.

The Agency selected the pollutants to regulate from the list of POCs considered for regulation, shown in Table 11-2. EPA believes that controlling the regulated pollutants will control all the remaining POCs considered for regulation for this segment. Controlling benzo(a)pyrene, phenol, and naphthalene will effectively control all other remaining organic constituent POCs. EPA believes the removal mechanisms in biological treatment systems that remove these parameters will also remove the remaining organic constituent POCs. Controlling mercury and selenium will also control the remaining metal POC, arsenic. Likewise, controlling total cyanide and thiocyanate will control the remaining cyanide compounds: amenable cyanide and weak acid dissociable (WAD) cyanide.

NSPS

To ensure that the regulations for new sources represent the most stringent numerical values attainable through the application of the best available control technology for all pollutants, EPA proposes to regulate the same pollutants as for BAT, as well as total suspended solids (TSS) and oil and grease (O&G).

11.3 Ironmaking Subcategory

EPA selected regulated pollutants for both the Blast Furnace and the Sintering Segments of the Ironmaking Subcategory. Table 11-3 lists pollutants proposed for regulation for this subcategory. The rationale for the selection of regulated pollutants for direct dischargers under this subcategory is presented below.

BAT

EPA proposes establishing BAT limitations for ammonia as nitrogen, lead, zinc, total cyanide, phenol, and TRC for both the Blast Furnace and Sintering Segments. In addition, 2,3,7,8-tetrachlorodibenzofuran (TCDF) is proposed for the Sintering Segment only. EPA proposes to limit TRC to ensure that residual concentrations of chlorine are kept to a minimum to avoid effluent toxicity. Facilities would not need to meet the TRC limit if they certify to the permitting authority that they do not use alkaline chlorination in their wastewater treatment.

The Agency selected the pollutants to regulate from the list of POCs considered for regulation, shown in Tables 11-4 and 11-5. EPA believes that controlling the regulated pollutants will also control all the remaining POCs considered for regulation for this subcategory. Ammonia as nitrogen, phenol, and total cyanide are characteristic of blast furnace ironmaking wastewater and are key indicators of the performance of the alkaline chlorination process. Lead and zinc are the principal metals present in wastewater from this subcategory; controlling these metals will control of the remaining metal POCs considered for regulation, as well as fluoride, which is also treated by the model technology. Likewise, controlling total cyanide will also control the remaining cyanide compounds considered for regulation: amenable cyanide, thiocyanate, and WAD cyanide. 2,3,7,8-TCDF is the principal PCDD/PCDF present in sintering wastewater and will indicate control of the remaining PCDDs/PCDFs. EPA is not proposing to regulate pyridine, the remaining organic constituent, because the model treatment system is not designed to treat organics and because the total estimated industry treated effluent loading of pyridine is minimal (0.07 lb-equivalents/year).

NSPS

To ensure that the regulations for new sources represent the most stringent numerical values attainable through the application of the best available control technology for all pollutants, EPA proposes to regulate the same pollutants as for BAT, as well as TSS and O&G.

11.4 Integrated Steelmaking Subcategory

The regulated pollutants selected for the Integrated Steelmaking Subcategory apply to all three manufacturing processes included in this subcategory: basic oxygen furnace (BOF) steelmaking, vacuum degassing, and continuous casting. EPA proposes to regulate ladle metallurgy at zero discharge of pollutants. Table 11-6 lists pollutants proposed for regulation for this subcategory. The rationale for the selection of regulated pollutants for direct dischargers under this subcategory is presented below.

BAT/NSPS

For this subcategory, EPA proposes establishing BAT and NSPS limitations for lead and zinc. These metals are key indicators of the performance of the solids removal and metals precipitation processes of the model BAT and NSPS treatment system.

The Agency selected the pollutants to regulate from the list of POCs considered for regulation, shown in Table 11-7. EPA believes that controlling the regulated pollutants will control all the other metal POCs considered for regulation in this subcategory. EPA is not proposing to regulate ammonia as nitrogen, because the model treatment system is not designed to treat it and because the total estimated industry treated effluent loading of ammonia as nitrogen is minimal (85 lb-equivalents/year).

11.5 Integrated and Stand-Alone Hot Forming Subcategory

EPA selected regulated pollutants for both the Carbon and Alloy Steel and the Stainless Steel Segments of the Integrated and Stand-Alone Hot Forming Subcategory. Table 11-8 lists pollutants proposed for regulation for this subcategory. The rationale for the selection of regulated pollutants for direct dischargers under this subcategory is presented below.

11.5.1 Carbon and Alloy Steel Segment

BAT

For this segment, EPA proposes BAT limitations for lead and zinc. These metals are key indicators of the performance of the solids removal and metals precipitation processes of the model BAT and NSPS treatment systems.

The Agency selected the pollutants to regulate from the list of POCs considered for regulation, shown in Table 11-9. EPA believes that controlling the regulated parameters will also control all of the other metal POCs considered for regulation in this subcategory, as well as fluoride, which is also treated by the model technology. The model treatment system is not specifically designed to treat ammonia as nitrogen, but the total estimated industry effluent loading is minimal at 1,086 lb-equivalents/year.

NSPS

To ensure that the regulations for new sources represent the most stringent numerical values attainable through the application of the best available control technology for all pollutants, EPA proposes to regulate the same pollutants as for BAT, as well as TSS and O&G.

11.5.2 Stainless Steel Segment

BAT

For this segment, EPA proposes establishing BAT limitations for chromium and nickel, rather than lead and zinc, because of their prominence in stainless steel. These metals are key indicators of the performance of the solids removal and metals precipitation processes of the model BAT and NSPS treatment systems.

The Agency selected the pollutants to regulate from the list of POCs considered for regulation, shown in Table 11-10. EPA believes that controlling the regulated pollutants will also control all other metal POCs considered for regulation in this subcategory, as well as fluoride, which is also treated by the model technology.

NSPS

To ensure that the regulations for new sources represent the most stringent numerical values attainable through the application of the best available control technology for all pollutants, EPA proposes to regulate the same pollutants as for BAT, as well as TSS and O&G.

11.6 <u>Non-Integrated Steelmaking and Hot Forming Subcategory</u>

EPA selected regulated pollutants for continuous casting and hot forming operations in both the Carbon and Alloy Steel and the Stainless Steel Segments of the Non-Integrated Steelmaking and Hot Forming Subcategory. EPA proposes to regulate electric arc furnace (EAF) steelmaking and ladle metallurgy manufacturing operations at zero discharge of pollutants. Table 11-11 lists pollutants proposed for regulation for this subcategory. The rationale for the selection of regulated pollutants for direct dischargers under this subcategory is presented below.

11.6.1 Carbon and Alloy Steel Segment

BAT

For this segment, EPA proposes BAT limitations for lead and zinc. These pollutants are key indicators of the performance of the solids removal and metals precipitation processes of the model BAT treatment system.

The Agency selected the pollutants to regulate from the list of POCs considered for regulation, shown in Table 11-12. EPA is not proposing to regulate ammonia as nitrogen, because the model treatment system is not designed to treat it and because the total estimated industry treated effluent loading of ammonia as nitrogen is minimal (179 lb-equivalents/year).

NSPS

EPA is proposing zero discharge of pollutants for NSPS.

11.6.2 Stainless Steel Segment

BAT

For this segment, EPA proposes BAT limitations for chromium and nickel, rather than lead and zinc, because of their prominence in stainless steel. These pollutants are key indicators of the performance of the solids removal and metals precipitation processes of the model BAT treatment system.

The Agency selected the pollutants to regulate from the list of POCs considered for regulation, shown in Table 11-13. EPA believes that controlling the regulated pollutants will also control all other metal POCs considered for regulation in this subcategory, as well as fluoride, which is also treated by the model technology.

NSPS

EPA is proposing zero discharge of pollutants for NSPS.

11.7 Steel Finishing Subcategory

EPA selected regulated pollutants for both the Carbon and Alloy Steel and the Stainless Steel Segments of the Steel Finishing Subcategory. Table 11-14 lists pollutants proposed for regulation for this subcategory. The rationale for the selection of regulated pollutants for direct dischargers under this subcategory is presented below.

11.7.1 Carbon and Alloy Steel Segment

BAT

For this segment, EPA established BAT limitations for hexavalent chromium, chromium, lead, and zinc. These metals are key indicators of the performance of the solids removal and metals precipitation processes of the model BAT and NSPS treatment systems.

The Agency selected the pollutants to regulate from the list of POCs considered for regulation, shown in Table 11-15. EPA believes that controlling the regulated pollutants will also control all other metal POCs in this subcategory, as well as fluoride, which is also treated by the model technology. The model treatment system is not specifically designed to treat organics, but the only organic constituent considered for regulation, n-eicosane, was removed by 93 percent in the model treatment system and was never detected in the effluent of any carbon and alloy steel finishing treatment systems. The model treatment system also is not specifically designed to treat ammonia as nitrogen, but it removed ammonia by 24 percent and the total estimated industry effluent loading is minimal (813 lb-equivalents/year).

The 1982 regulation also limits naphthalene and tetrachloroethylene for cold forming wastewater; EPA does not propose regulating these parameters. EPA did not select either naphthalene or tetrachloroethylene as a POC for the Carbon and Alloy Steel Segment of the Steel Finishing Subcategory. As a result of the 1982 regulation, most cold forming facilities started using cold rolling lubricant formulations that did not contain these toxic organic constituents. Because EPA is not proposing to revise BPT for this subcategory, facilities continuing to use naphthalene and tetrachloroethylene in their cold forming solutions would still be subject to 1982 BPT limits (which are equivalent to 1982 BAT limits) on these pollutants.

NSPS

To ensure that the regulations for new sources represent the most stringent numerical values attainable through the application of the best available control technology for all pollutants, EPA proposes to regulate the same pollutants as for BAT, as well as TSS and O&G.

11.7.2 Stainless Steel Segment

BAT

For this segment, EPA established BAT limitations for hexavalent chromium, chromium, nickel, ammonia as nitrogen, and fluoride. These pollutants are key indicators of the performance of the solids removal and metals precipitation processes of the model BAT and NSPS treatment systems. Because ammonia as nitrogen is chiefly present only in wastewater from nitric acid pickling operations, ammonia as nitrogen is only regulated for acid pickling and other descaling operations and wet air pollution control devices associated with these operations.

The Agency selected the pollutants to regulate from the list of POCs considered for regulation, shown in Table 11-16. EPA believes that controlling regulated pollutants will also control all other POCs considered for regulation in this subcategory.

EPA is considering developing a limit for nitrate/nitrite for stainless steel finishing operations with combination acid pickling. EPA identified nitrate/nitrite as a POC for stainless steel acid pickling operations that use nitric acids and combinations of nitric and hydrofluoric acids to treat the surfaces of various grades of stainless steels. Nitrates originate from the nitric acids used in the process and are released from three sources: waste or spent pickling acids, pickle rinse waters, and acid pickling fume scrubbers. Some stainless steel finishing facilities dispose of their nitrate-bearing wastewater via off-site hauling. Many other stainless steel finishing facilities treat spent nitric acid and nitric/hydrofluoric acid pickle liquors on site with the pickling rinse waters and fume scrubber waters from other stainless steel finishing operations. Nitrates are soluble in water and, thus, are not removed to any appreciable degree in the metals precipitation systems used to treat chromium and nickel in stainless steel finishing wastewater.

EPA collected information from mills with stainless steel finishing operations with on-site chemical precipitation treatment of spent nitric and nitric/hydrofluoric acids in combination with pickle rinse waters and acid pickling fume scrubber blowdown. The treated effluent nitrate concentrations from these mills ranged from about 500 mg/L to more than 1,000 mg/L.

Several stainless steel acid pickling lines use acid purification systems to recover and reuse nitric and nitric/hydrofluoric acids. This technology removes dissolved metals (iron, chromium, nickel) from a side stream of the strong acid pickling solution and returns the purified acid to the acid pickling bath. This essentially extends the life of the pickling acids, thereby reducing the consumption of virgin nitric acid. A reject stream containing dilute acid and the dissolved metals is periodically sent to wastewater treatment.

The model BAT technology for stainless steel finishing operations includes acid purification units for recovery and reuse of spent nitric and nitric/hydrofluoric acid pickling solutions. EPA believes facilities using acid purification technology can achieve long-term average concentrations of nitrates in the treated stainless steel acid pickling wastewater effluent in the range of 200 mg/L to 300 mg/L.

The 1982 regulation also limits naphthalene and tetrachloroethylene for cold forming wastewater and total cyanide for salt bath descaling operations; EPA does not propose regulating these parameters. EPA did not select tetrachloroethylene as a POC for this segment; EPA did select naphthalene as a POC for this segment, but did not consider it for regulation because it was not detected in the influent of the model treatment facilities (naphthalene was also not detected in the effluent of any facility in this segment). As a result of the 1982 regulation, most cold forming facilities started using cold rolling lubricant formulations that did not contain these toxic organic constituents. EPA also does not propose regulating total cyanide because, as a result of the 1982 regulation, many facilities changed their descaling solutions or started using new descaling processes such as electrolytic sodium sulfate descaling. Because EPA is not proposing to revise BPT for this subcategory, facilities continuing to use cyanide in their reducing salt bath descaling operations or naphthalene and tetrachloroethylene in their cold forming solutions would still be subject to 1982 BPT limits (which are equivalent to 1982 BAT limits) on these pollutants.

NSPS

To ensure that the regulations for new sources represent the most stringent numerical values attainable through the application of the best available control technology for all pollutants, EPA proposes to regulate the same pollutants as for BAT, as well as TSS and O&G.

11.8 Other Operations Subcategory

EPA selected regulated pollutants for the Direct Reduced Ironmaking and the Forging Segments of the Other Operations Subcategory. The Briquetting Segment is proposed to be regulated at zero discharge of pollutants. Table 11-17 presents the list of pollutants proposed for regulation for the Other Operations Subcategory. The rationale for the selection of regulated pollutants for direct dischargers under this subcategory is presented below.

11.8.1 Direct Reduced Ironmaking Segment

BPT/BCT/NSPS

The Agency proposes to regulate TSS for the Direct Reduced Ironmaking Segment. This pollutant is a key indicator of the performance of the solids removal and filtration processes of the model treatment systems.

The Agency selected TSS to regulate from the list of POCs considered for regulation, shown in Table 11-18. EPA believes that controlling TSS will also incidentally control all other POCs considered for regulation in this segment.

11.8.2 Forging Segment

BPT/BCT/NSPS

The Agency proposes to regulate TSS and O&G for the Forging Segment. EPA is not proposing BAT limitations for this segment because it identified no priority or nonconventional POCs for the segment.

11.9 Regulated Pollutant Selection Methodology for Indirect Dischargers

Unlike direct dischargers whose wastewater receives no further treatment once it leaves the facility, indirect dischargers send their wastewater to publicly owned treatment works (POTWs) for further treatment. However, POTWs typically install secondary biological treatment systems which are designed to control conventional pollutants (biochemical oxygen demand (BOD_5), TSS, O&G, pH, and fecal coliform), the principal parameters in domestic sewage. Except for nutrient control for ammonia and phosphorus, POTWs usually do not install (advanced or tertiary treatment) technology to control priority and nonconventional pollutants, although secondary biological treatment systems may achieve significant removals for some priority pollutants. Instead, the Clean Water Act envisions that, implementation of pretreatment programs and industrial compliance with categorical pretreatment standards, will adequately control priority and nonconventional pollutants in municipal effluents.

Therefore, for indirect dischargers, before establishing national technology-based pretreatment standards, EPA examines whether the pollutants discharged by the industry "pass through" POTWs to waters of the United States or interfere with POTW operations or sludge disposal practices. Generally, to determine if pollutants pass through POTWs, EPA compares the percentage of the pollutant removed by well-operated POTWs achieving secondary treatment with the percentage of the pollutant removed by facilities meeting the proposed BAT effluent limitations. A pollutant is determined to "pass through" POTWs when the median percentage removed by well-operated POTWs is less than the median percentage removed by direct dischargers complying with BAT effluent limitations. In this manner, EPA can ensure that the combined treatment at indirect dischargers and POTWs is at least equivalent to treatment by direct dischargers.

For specific pollutants, such as volatile organic compounds, EPA may use other means to determine pass-through. These evaluations may include chemical and physical properties (e.g., Henry's Law constants, octanol/water partition coefficients, and water solubility constants) and empirical data to estimate amounts of volatilization, biodegradation, and/or partitioning to the residue solids phase.

This approach to the definition of pass-through satisfies two competing objectives set by Congress: (1) that standards for indirect dischargers be equivalent to standards for direct dischargers, and (2) that the treatment capability and performance of POTWs be recognized and taken into account in regulating the discharge of pollutants from indirect dischargers. Rather than compare the mass or concentration of pollutants discharged by POTWs with the mass or concentration of pollutants discharged by BAT facilities, EPA compares the percentage of the pollutants removed by BAT facilities to the POTW removals. EPA takes this approach because comparing the mass or concentration of pollutants in POTW effluents with pollutants in BAT facility effluents would not take into account the mass of pollutants discharged to the POTW from other industrial and nonindustrial sources, nor the dilution of the pollutants in the POTW effluent to lower concentrations from the addition of large amounts of other industrial and nonindustrial water.

In selecting the regulated pollutants under the pretreatment standards, EPA starts with the priority and nonconventional pollutants regulated for direct dischargers under BAT for each subcategory and submits those pollutants to the pass-through test. Those pollutants that EPA determines pass through POTWs are the pollutants it proposes to regulate. The following subsections describe the methodology used in determining median percent removals for "well-operated" POTWs and the median percent removals for the BAT technologies. Sections 11.10 through 11.16 present the results of the POTW pass-through analysis for each subcategory, along with discussions of regulated pollutant selection for PSES and PSNS.

11.9.1 POTW Pass-Through Methodology

The following subsections describe the methodology used in determining median percent removals for "well-operated" POTWs and the proposed BAT technologies and the methodology used for the volatile override test of the pass-through analysis.

Determination of Percent Removals for Well-Operated POTWs

The following explains the methodology used to estimate percent removals for well-operated POTWs for the proposed Iron and Steel rule. EPA is considering revising its determination of percent removals for "well-operated" POTWs. Interested parties should consult Appendix B and provide comment.

For the proposed Iron and Steel rule, EPA used its traditional methodology to determine POTW performance (percent removal) for priority and nonconventional pollutants. POTW performance is a component of the pass-through methodology used to identify the pollutants to be regulated for PSES and PSNS. It is also a component of the analysis to determine net pollutant reductions (for both total pounds and toxic pound-equivalents) for various indirect discharge technology options (see Section 10). However, as discussed in more detail in Appendices B and C, EPA is considering revising its traditional methodology for determining POTW performance (percent removals) for priority and nonconventional pollutants.

The primary source of the POTW percent removal data is the Fate of Priority Pollutants in Publicly Owned Treatment Works (Reference 11-1), commonly referred to as the "50-POTW Study." However, the 50-POTW Study did not contain data for all pollutants for which the pass-through analysis was required. Therefore, EPA obtained additional data from EPA's National Risk Management Research Laboratory (NRMRL)'s Treatability Database (formerly called the Risk Reduction Engineering Laboratory (RREL) Treatability Database), as well as data from POTWs that accept iron and steel plant wastewater. EPA used data from the latter source only if no data were available from the 50-POTW Study or the NRMRL database. These sources and their uses are discussed below.

The 50-POTW Study presents data on the performance of 50 well-operated POTWs that use secondary biological treatment in removing pollutants. At the time of the 50-POTW sampling program, which spanned approximately 2.5 years (July 1978 to November 1980), EPA collected samples at selected POTWs across the United States. At most of these POTWs, EPA collected a minimum of 6 days of 24-hour composite influent and effluent wastewater samples. EPA analyzed each sample for the conventional pollutants (excluding fecal coliform), selected nonconventional pollutants, and 126 priority pollutants. The conventional pollutants, listed at 40 CFR 401.16, are BOD_5, TSS, O&G, pH, and fecal coliform. The selected nonconventional pollutants included COD, TOC, total phenols, ammonia as nitrogen, iron, aluminum, and magnesium, among others. The priority pollutants consist of the 126 compounds (listed in Appendix A of 40 CFR Part 423) that are a subset of the 65 priority pollutants and classes of pollutants referred to in Section 307(a) of the Clean Water Act and listed at 40 CFR 401.15. A total of 102 of the 126 priority pollutants were detected at least once in POTW influents (Reference 11-1).

Each laboratory reported results for the pollutants that it tested. If the laboratory found a pollutant to be present, the laboratory reported a result. If the laboratory found the pollutant not to be present, the laboratory reported either that the pollutant was "not detected' or a value with a "less than" sign (<) indicating that the pollutant was below that value. The value reported along with the "less than" sign was the lowest level to which the laboratory believed it could reliably measure. EPA subsequently established these lowest levels as the minimum levels of quantitation (MLs). In some instances, different laboratories reported different MLs for the same pollutant using the same analytical method.

Because of the variety of reporting protocols among the 50-POTW Study laboratories (Reference 11-1), EPA reviewed the percent removal calculations used in the pass-through analysis for previous industry studies, including those performed when developing the effluent limitations guidelines and standards for Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF), Commercial Hazardous Waste Combustors, and Centralized Waste Treatment (CWT) industries. EPA found that, for 12 parameters, different analytical MLs were reported for different rulemaking studies (nine of the metals, cyanide, and one of the organics). To provide consistency for data analysis and establishment of removal efficiencies, EPA reviewed the 50-POTW Study and standardized the reported MLs for use in the CWT final rule and other rulemaking efforts.

In using the 50-POTW Study data to estimate percent removals, EPA established data-editing criteria for determining pollutant percent removals. As noted in the 50-POTW Study, analytical laboratories reported pollutant concentrations below the ML qualitatively, as "not detected" or "trace," and reported a measured value above this level (Reference 11-1). Subsequent rulemaking studies such as the 1987 OCPSF study used the analytical method ML established in 40 CFR Part 136 for laboratory data reported below the analytical ML. Using the ML may overestimate the effluent concentration and underestimate the percent removal. (If the actual effluent concentration is less than the minimum level, then the calculated percent removal based on the actual value would be higher.) Because the data collected for evaluating POTW percent removals included both effluent and influent levels that were close to the analytical ML, EPA devised hierarchial data-editing criteria to exclude data with low influent concentration levels, thereby minimizing the possibility that low POTW removals might simply reflect low influent concentrations instead of being a true measure of treatment effectiveness.

EPA used hierarchic data-editing criteria for the pollutants in the 50-POTW Study. For the proposed Iron and Steel rule, the data-editing criteria included the following:

- Both influent and effluent data on a given date were deleted if either datum has a notation of analytical interference;
- The standardized pollutant-specific analytical ML was substituted for values reported as "not detected," "trace," "less than (followed by a number)," or a number less than the standardized analytical ML;
- Detected pollutants had to have at least three pairs (influent/effluent) of data points to be included;
- The average pollutant influent level had to be greater than or equal to 10 times the pollutant minimum level (10 × ML); and
- If none of the average pollutant influent concentrations were at least 10 times the minimum level, then data with average influent values greater than twice the minimum level (2 × ML) or greater than or equal to 20 µg/L were included, along with the corresponding average effluent values.

EPA then calculated each POTW percent removal for each pollutant based on its average influent and effluent values. The national POTW percent removal used for each pollutant in the pass-through test is the median value of all the POTW pollutant-specific percent removals.

The rationale for retaining POTW data using the "10 times the pollutant minimum level" editing criterion was based on the BAT organic pollutant treatment performance editing criteria initially developed for the 1987 OCPSF regulation (40 CFR Part 414; 52 FR 42522 at 42545 to 48). BAT treatment system designs in the OCPSF industry typically removed at least 90 percent of toxic pollutants. Since most of the OCPSF effluent data from BAT biological treatment systems had values of "not detected,"[1] the average influent concentration for a compound had to be at least 10 times the analytical ML for the difference to be meaningful (demonstration of at least 90 percent removal) and qualify effluent concentrations for calculation of effluent limits (Reference 11-2).

EPA also used data from the NRMRL Treatability Database (Reference 11-3) to augment the POTW database for the pollutants that the 50-POTW Study did not cover. This database provides information, by pollutant, on removals obtained by various treatment technologies. The database provides the specific data source and the industry from which the wastewater was generated. For each POC that EPA considered for the proposed rule not found in the 50-POTW Study database, EPA used data from the NRMRL database, using only treatment technologies representative of typical POTW secondary treatment operations (i.e.,

[1] Of the 57 regulated organic pollutants, limits for 34 (60 percent) were based on long-term averages (LTAs) of "not detected" or the analytical minimum level (Development Document for Effluent Limitations Guidelines and Standards for the Organic Chemicals, Plastics, and Synthetic Fibers Point Source Category – the OCPSF DD, Vol. I. EPA 440/1-87/009, October 1987, pages VII-208 to VII-210).

activated sludge, activated sludge with filtration, and aerated lagoons). EPA further edited these files to include information pertaining only to domestic or industrial wastewater. EPA used pilot-scale and full-scale data only, and eliminated bench-scale data and data from less reliable references. Zero and negative percent removals were eliminated, as well as data with less than two pairs of influent/effluent data points. Finally, EPA calculated the average percent removal for each pollutant from the remaining pollutant removal data.

EPA used one additional source to determine POTW percent removals: data collected from POTWs receiving wastewater from iron and steel sites. The Agency used these data for determining the POTW percent removal for TKN and WAD cyanide. The following table presents the data for these pollutants.

1997 POTW Data for TKN and WAD Cyanide Removals

POTW	Influent (mg/L)	Effluent (mg/L)	Percent Removal
TKN			
Middletown, OH POTW	24.6	4.3	83%
City of Warren, OH POTW	17.4	1.8	89%
Greater Chicago, IL POTW (Calumet)	23.7	0.63	97%
Average (TKN)			**90%**
WAD Cyanide			
City of Warren, OH POTW	0.16	0.009	93%
Average (WAD Cyanide)			**93%**

In addition to the sources listed above, EPA transferred some POTW percent removals from another pollutant. Table 10-2 in Section 10 lists which pollutants received a transferred POTW percent removal and from which surrogate pollutant.

EPA selected the final percent removal for each pollutant based on data hierarchy, which was related to the quality of the data source. The Agency used the following hierarchy to select a POTW percent removal for a pollutant:

- The median percent removal from the 50-POTW Study was chosen using all POTW data with influent levels greater than or equal to 10 times the pollutant minimum analytical detection limit;

- The median percent removal from the 50-POTW Study was chosen using all POTW data with influent levels greater than two times the pollutant minimum analytical detection limit or 2 µg/L;

- The average percent removal from the NRMRL Treatability Database was chosen using only domestic wastewater;

- The average percent removal from the NRMRL Treatability Database was chosen using domestic and industrial wastewater;

- The average percent removal from POTWs receiving iron and steel industry wastewater was chosen; and

- The pollutant was assigned an average group percent removal, "generic" percent removal, or surrogate pollutant percent removal.

The CWT rule developed pollutant groups by combining pollutants with similar chemical structures. EPA calculated the average group percent removal by using all pollutants in the group with selected percent removals from either the 50-POTW Study or the NRMRL Treatability Database. EPA then averaged percent removals together to determine the average group percent removal. Chapter 7 of the U.S. EPA <u>Development Document for Proposed Effluent Limitations Guidelines and Standards for the Centralized Waste Treatment Industry (Volume I)</u> (Reference 11-4) presents pollutant groups and generic removals used in the pass-through analysis.

Table 10-2 in Section 10 presents the final POTW percent removal assigned to each pollutant. Table 11-19 presents the POTW percent removals for pollutants proposed for regulation at BAT, along with the source and data hierarchy of each removal.

Methodology for Determining Treatment Technology (BAT) Percent Removals

EPA calculated treatment percent removals for each selected BAT option using the data used to determine the option LTAs and variability factors. Therefore, the data used to calculate treatment option percent removals was subjected to the same data-editing criteria as the data used in calculating LTAs and variability factors (described in Section 12). This editing included excluding the influent and effluent data for pollutants that were not detected in the influent at treatable levels, excluding data for pollutants that were not treated by the technology, and excluding data that were associated with process upsets.

EPA used the influent and effluent concentrations (paired data) at sites incorporating BAT to calculate the percent removal, if available. If there were multiple BAT sites with pollutant data, EPA calculated a percent removal for each site and used the median percent removal for the pass-through analysis. For the Cokemaking (ammonia as nitrogen and total cyanide only), Ironmaking (ammonia as nitrogen, lead, total cyanide, and zinc only), and Non-Integrated Steelmaking and Hot Forming (Carbon and Alloy Segment) Subcategories, influent data were not available for BAT sites and the average influent concentration was calculated using EPA's iron and steel sampling data.

After editing the data, EPA used the following methodology to calculate percent removals:

1. For each pollutant and each BAT facility (or sampled facility), EPA averaged the influent and effluent data to give an average influent concentration and an average effluent concentration.

2. EPA calculated percent removals for each pollutant and each BAT facility (or sampled facility) from the average influent and average effluent concentrations using the following equation:

$$\text{Percent Removal} = \frac{C_i(\text{avg}) - C_e(\text{avg})}{C_i(\text{avg})} \times 100 \qquad (11\text{-}1)$$

where:

$C_i(\text{avg})$ = Average influent concentration, mg/L
$C_e(\text{avg})$ = Average effluent concentration, mg/L.

EPA used the above equation for all pollutants and subcategories, except for benzo(a)pyrene, mercury, naphthalene, phenol, selenium, and thiocyanate for the Cokemaking Subcategory. The Agency calculated percent removals for these pollutants using paired data from the cokemaking BAT site, where control water is added to the treatment system resulting in dilution of the influent. To ensure that the calculated BAT percent removal was actual treatment, rather than dilution, EPA performed a mass loadings analysis and calculated the percent removal using the following equation:

$$\text{Percent Removal} = \frac{[C_i \times F_i]_{avg} - [C_e \times F_e]_{avg}}{[C_i \times F_i]_{avg}} \times 100 \qquad (11\text{-}2)$$

where:

C_i = Influent concentration
F_i = Influent flow rate
C_e = Effluent concentration
F_e = Effluent flow rate.

3. EPA calculated the BAT median percent removal for each pollutant for each selected BAT option from the facility-specific percent removals.

Volatile Override for Cokemaking

EPA applies the volatile override test when the overall percent removal estimated for well-operated POTWs is substantially caused by emission of the pollutant to the air rather than by actual treatment. Therefore, even though the POTW percent removal data indicate that volatile pollutants would not pass through, regulation of these pollutants is warranted to ensure their "treatment."

The EPA-selected technology option for the Cokemaking Subcategory is designed to control the emission of volatile pollutants. As such, for the proposed rulemaking, EPA believes the volatile override test is appropriate and has determined pass-through for the Cokemaking Subcategory by comparing percent removals and Henry's Law Constants.

The selected BAT technology option for the Cokemaking Subcategory is the only option designed to treat volatile pollutants; therefore, it is the only subcategory for which the volatile override test is applicable. Because this analysis applies only to pollutants that potentially volatilize and do not pass through based on percent removal comparison, it applies only to benzo(a)pyrene. For this analysis, EPA considered pollutants with a Henry's Law Constant greater than 10^{-4} atm·m^3/mol to pass through POTWs based on the volatile override.

11.10 Cokemaking Subcategory

EPA selected proposed regulated pollutants for only the By-Product Recovery Cokemaking Segment of the Cokemaking Subcategory; EPA proposes zero discharge of pollutants from the Non-Recovery Segment. Table 11-1 lists the pollutants proposed for regulation for this subcategory. The rationale for the selection of regulated pollutants for indirect dischargers under this subcategory is presented below.

PSES/PSNS

Of the nine pollutants selected for regulation at BAT, EPA evaluated eight of these for pass-through. The only pollutant regulated at BAT but not evaluated for pass-through was total residual chlorine (TRC). TRC is not characteristic of cokemaking wastewater, but indicates post-alkaline-chlorination residual chlorine concentration. EPA did not evaluate TRC for pass-through because the selected PSES option does not include alkaline chlorination. Table 11-20 presents pass-through results for the Cokemaking Subcategory.

Of the eight pollutants evaluated, six were found to pass through:

- Nonconventionals - Ammonia as nitrogen, thiocyanate, and total cyanide;
- Priority organic constituents - Naphthalene and phenol; and
- Priority metal - selenium.

Therefore, EPA proposes to regulate these six parameters for PSES and PSNS. EPA notes that ammonia as nitrogen is a key indicator of the performance of the PSES and PSNS treatment systems because it reflects the performance of the ammonia stills, which not only control ammonia as nitrogen, but also acid gases (hydrogen cyanide, hydrogen sulfide) and volatile organic pollutants (benzene, toluene, xylenes). Some portions of these gases would otherwise be emitted to the air in coke plant and municipal sewer systems and in biological processes at POTWs.

11.11 Ironmaking Subcategory

EPA selected regulated pollutants for both the Blast Furnace and the Sintering Segments of the Ironmaking Subcategory. Table 11-3 lists the pollutants proposed for regulation for this subcategory. The rationale for the selection of regulated pollutants for indirect dischargers under this subcategory is presented below.

PSES/PSNS

Of the seven pollutants selected for regulation at BAT, EPA evaluated six of these for pass through. The only pollutant regulated at BAT, but not evaluated for pass-through, was TRC. TRC is not characteristic of ironmaking wastewater, but is an indicator of post-alkaline-chlorination residual chlorine concentration. Since the selected PSES option for ironmaking does not contain alkaline chlorination, TRC will not be regulated. Table 11-21 presents pass-through results for the ironmaking subcategory.

Of the six pollutants evaluated, four were found to pass through. Listed below are the pollutants found to pass through for the Ironmaking Subcategory:

- Nonconventional - Ammonia as nitrogen;
- Nonconventional organic constituent - 2,3,7,8-TCDF; and
- Priority metals - Lead and zinc.

EPA proposes to regulate these parameters for PSES and PSNS (2,3,7,8-TCDF for the Sintering Segment only).

11.12 Integrated Steelmaking Subcategory

The regulated pollutants selected for the Integrated Steelmaking Subcategory apply to all three manufacturing processes included in this subcategory: basic oxygen furnace (BOF) steelmaking, vacuum degassing, and continuous casting. EPA proposes to regulate ladle metallurgy at zero discharge of pollutants. Table 11-6 lists pollutants proposed for regulation for this subcategory. The rationale for the selection of regulated pollutants for indirect dischargers under this subcategory is presented below.

PSES/PSNS

Two pollutants were selected for regulation at BAT: lead and zinc. Both were found to pass through POTWs. Table 11-22 presents the pass-through results for the Integrated Steelmaking Subcategory.

EPA proposes to regulate lead and zinc at PSES and PSNS.

11.13 Integrated and Stand-Alone Hot Forming Subcategory

EPA selected regulated pollutants for both the Carbon and Alloy Steel and the Stainless Steel Segments of the Integrated and Stand-Alone Hot Forming Subcategory. Table 11-8 lists the pollutants proposed for regulation for this subcategory. The rationale for the selection of regulated pollutants for indirect dischargers under this subcategory is presented below.

11.13.1 Carbon and Alloy Steel Segment

PSES

Two pollutants were selected for regulation at BAT for the Carbon and Alloy Steel Segment: lead and zinc. Neither pollutant was found to pass through POTWs. Table 11-23 presents the pass-through results for the Integrated and Stand-Alone Hot Forming Subcategory.

EPA proposes not to revise PSES for this segment. The Agency believes that pretreatment local limits implemented on a case-by-case basis can more appropriately address any individual toxic parameters present at these facilities. The Agency also does not believe that it is practicable for a direct discharging facility covered by this segment to become an indirect discharging facility because its flows would be too large for a POTW to handle.

PSNS

EPA does not propose to revise PSNS for this segment because EPA does not foresee the construction of any new indirect discharging facilities that would be subject to this segment.

11.13.2 Stainless Steel Segment

PSES/PSNS

Two pollutants were selected for regulation at BAT for the Stainless Steel Segment: chromium and nickel. Both pollutants were found to pass through POTWs. Table 11-23 presents pass-through results for the Integrated and Stand-Alone Hot Forming Subcategory.

EPA proposes not to revise PSES or PSNS for this segment. The Agency believes that pretreatment local limits implemented on a case-by-case basis can more appropriately address any individual toxic parameters present at these facilities. The Agency also does not believe that it is practicable for a direct discharging facility covered by this segment to become an indirect discharging facility because its flows would be too large for a POTW to handle.

11.14 Non-Integrated Steelmaking and Hot Forming Subcategory

EPA selected regulated pollutants for continuous casting and hot forming operations in both the Carbon and Alloy Steel and the Stainless Steel Segments of the Non-Integrated Steelmaking and Hot Forming Subcategory. EPA proposes to regulate EAF steelmaking and ladle metallurgy manufacturing operations at zero discharge of pollutants. Table 11-11 lists the pollutants proposed for regulation for this subcategory. The rationale for the selection of regulated pollutants for indirect dischargers under this subcategory is presented below.

11.14.1 Carbon and Alloy Steel Segment

PSES

Two pollutants were selected for regulation at BAT for the Carbon and Alloy Segment: lead and zinc. Neither pollutant was found to pass through POTWs. Table 11-24 presents pass-through results for the Non-Integrated Steelmaking and Hot Forming Subcategory.

EPA does not propose to revise PSES for this segment.

PSNS

EPA is proposing zero discharge of process wastewater for PSNS.

11.14.2 Stainless Steel Segment

PSES

Two pollutants were selected for regulation at BAT for the stainless segment: chromium and nickel. Both pollutants were found to pass through POTWs. Table 11-24 presents pass-through results for the Non-Integrated Steelmaking and Hot Forming Subcategory.

EPA proposes to regulate chromium and nickel at PSES.

PSNS

EPA is proposing zero discharge of process wastewater for PSNS.

11.15 Steel Finishing Subcategory

EPA selected regulated pollutants for both the Carbon and Alloy Steel and the Stainless Steel Segments of the Steel Finishing Subcategory. Table 11-14 lists the pollutants proposed for regulation for this subcategory. The rationale for the selection of regulated pollutants for indirect dischargers under this subcategory is presented below.

11.15.1 Carbon and Alloy Steel Segment

PSES

Four pollutants were selected for regulation at BAT for the carbon and alloy segment. Of the four, chromium, hexavalent chromium, and zinc were found to pass through POTWs. Table 11-25 presents pass-through results for the Steel Finishing Subcategory.

EPA does not propose to revise PSES for this segment; the PSES limits currently in 40 CFR Part 420 for each manufacturing process except electroplating would continue to apply under this proposal. Limits for the electroplating manufacturing process are currently included in 40 CFR Part 433. The PSES limits in 40 CFR Part 433 are concentration-based, as opposed to those in 40 CFR Part 420, which are mass-based. To ensure a consistent basis for facilities operating other operations in addition to electroplating, EPA is proposing to convert the existing 40 CFR Part 433 PSES concentration-based limits to mass-based limits by multiplying by the proposed BAT production-normalized flow rate and the appropriate conversion factor. Nine pollutants are regulated under PSES at 40 CFR Part 433, some of which do not apply to electroplating operations as performed in the iron and steel industry. EPA proposes to specify PSES limits for four of the pollutants: chromium, lead, nickel, and zinc. EPA identified these four metals as POCs for electroplating manufacturing operations (see Section 7). EPA does not believe this action will result in incremental cost increases to the industry.

PSNS

EPA is proposing to regulate the same pollutants as for BAT.

11.15.2 Stainless Steel Segment

PSES

Five pollutants were selected for regulation at BAT for the stainless segment. Of the five, fluoride, chromium, hexavalent chromium, and nickel were found to pass through. Table 11-25 presents pass-through results for the Steel Finishing Subcategory.

EPA does not propose to revise PSES for this segment.

PSNS

EPA is proposing to regulate the same pollutants as for BAT.

11.16 Other Operations Subcategory

EPA selected regulated pollutants for the Direct Reduced Ironmaking and the Forging Segments of the Other Operations Subcategory. EPA proposes to regulate the Briquetting Segment at zero discharge of pollutants. Table 11-17 lists the pollutants proposed for regulation for this subcategory. The rationale for the selection of regulated pollutants for indirect dischargers under this subcategory is presented below.

11.16.1 Direct Reduced Ironmaking Segment

PSES/PSNS

For the Direct Reduced Ironmaking Segment, no pollutants were selected for regulation at BAT and only conventional pollutants were selected for BPT; therefore, EPA did not perform a pass-through analysis for this segment. The Agency reserves PSES/PSNS for the Direct Reduced Ironmaking Segment.

11.16.2 Forging Segment

PSES/PSNS

For the Forging Segment, no pollutants were selected for regulation at BAT and only conventional pollutants were selected for BPT; therefore, EPA did not perform a pass-through analysis for this segment. The Agency reserves PSES/PSNS for the Forging Segment.

11.17 References

11-1. U.S. Environmental Protection Agency. Fate of Priority Pollutants in Publicly Owned Treatment Works. EPA 440/1-82/303. Washington, D.C., September 1982.

11-2. U.S. Environmental Protection Agency. Development Document for Effluent Limitations Guidelines and Standards for the Organic Chemicals, Plastics, and Synthetic Fibers Point Source Category (Volume 1). EPA-440/1-87/009. Washington, D.C., October 1987.

11-3. U.S. Environmental Protection Agency. National Risk Management Research Laboratory (NRMRL) Treatability Database Version 5.0. Cincinnati, OH, 1994.

11-4. U.S. Environmental Protection Agency. Development Document for Proposed Effluent Limitations Guidelines and Standards for the Centralized Waste Treatment Industry (Volume I). EPA-821-R-98-020. Washington, D.C., December 1998.

Table 11-1

Proposed Regulated Pollutants for the Cokemaking Subcategory

Pollutant	BAT	PSES	NSPS	PSNS
Total suspended solids (TSS)			✔	
Oil and grease (O&G)			✔	
Ammonia as nitrogen	✔	✔	✔	✔
Total cyanide	✔	✔	✔	✔
Thiocyanate	✔	✔	✔	✔
Mercury	✔		✔	
Selenium	✔	✔	✔	✔
Benzo(a)pyrene	✔		✔	
Naphthalene	✔	✔	✔	✔
Phenol	✔	✔	✔	✔
Total residual chlorine (TRC)	✔		✔	

Notes: EPA is proposing zero discharge of pollutants for the Non-Recovery Cokemaking Segment of this subcategory, and is not proposing to revise BPT or BCT for this subcategory.

Table 11-2

Pollutants Considered for Regulation for Direct Dischargers
Cokemaking Subcategory - By-Product Recovery Segment

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Conventional pollutants	Biochemical oxygen demand 5-day (BOD_5)						✔
	Biochemical oxygen demand 5-day (BOD_5) - carbonaceous						✔
	Oil and grease (O&G)						✔
	Total suspended solids (TSS)						✔
Nonconventional pollutants	Amenable cyanide						✔
	Ammonia as nitrogen						✔
	Chemical oxygen demand (COD)	✔					
	Nitrate/nitrite	✔				✔	
	Total petroleum hydrocarbons (TPH)	✔					
	Thiocyanate						✔
	Total Kjeldahl nitrogen (TKN)	✔					
	Total organic carbon (TOC)	✔					
	Total phenols	✔					
	Weak acid dissociable (WAD) cyanide						✔
Priority metals	Arsenic						✔
	Mercury						✔
	Selenium						✔
Nonconventional metals	Boron			✔	✔		

Table 11-2 (Continued)

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Priority organic constituents	Acenaphthene						✔
	Acenaphthylene						✔
	Anthracene						✔
	Benzidine				✔		
	Benzo(a)anthracene						✔
	Benzo(b)fluoranthene						✔
	Benzo(k)fluoranthene				✔		
	Benzo(ghi)perylene				✔		
	Benzo(a)pyrene						✔
	Chrysene						✔
	2,4-Dimethylphenol						✔
	Fluoranthene						✔
	Fluorene						✔
	Indeno(1,2,3-cd)pyrene				✔		
	Naphthalene		✔				✔*
	Phenanthrene		✔				
	Phenol						✔
	Pyrene						✔
	Benzene		✔				
	1,2-Dichloroethane		✔		✔		
	Ethylbenzene		✔				
	Toluene		✔				

Table 11-2 (Continued)

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Nonconventional organic constituents	Aniline		✔				
	2,3-Benzofluorene		✔		✔		
	Biphenyl		✔				
	Carbazole						✔
	o-Cresol						✔
	p-Cresol						✔
	Dibenzofuran		✔				
	Dibenzothiophene		✔				
	n-Eicosane		✔		✔		
	n-Hexadecane		✔		✔		
	4,5-Methylene phenanthrene						✔
	2-Methylnaphthalene		✔				
	1-Methylphenanthrene		✔		✔		
	1-Naphthylamine				✔		
	beta-Naphthylamine						✔
	n-Octadecane		✔		✔		
	Perylene				✔		
	2-Phenylnaphthalene		✔				
	2-Picoline						✔
	Pyridine						✔
	Styrene		✔				
	Thianaphthene						✔

Table 11-2 (Continued)

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Nonconventional organic constituents (continued)	o-Toluidine						✔
	2-Propanone						✔
	Carbon disulfide		✔				
	2-Butanone						✔
	m-Xylene		✔				
	m- + p-Xylene		✔				
	o-Xylene		✔				
	o- + p-Xylene		✔				
Other priority pollutant	Total cyanide						✔

Note: EPA will consider naphthalene for regulation for this segment because it is semi-volatile and an important indicator of biological treatment effectiveness.

Table 11-3

Proposed Regulated Pollutants for the Ironmaking Subcategory

Pollutant	BAT	PSES	NSPS	PSNS
Total suspended solids (TSS)			✔	
Oil and grease (O&G)			✔	
Ammonia as nitrogen	✔	✔	✔	✔
Total cyanide	✔		✔	
Lead	✔	✔	✔	✔
Zinc	✔	✔	✔	✔
Phenol	✔		✔	
2,3,7,8-TCDF (Sintering Segment only)	✔	✔	✔	✔
Total residual chlorine (TRC)	✔		✔	

Note: EPA is not proposing to revise BPT or BCT for this subcategory.

Table 11-4

Pollutants Considered for Regulation for Direct Dischargers Ironmaking Subcategory - Sintering Segment

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Conventional pollutants	Oil and grease (O&G)						✔
	Total suspended solids (TSS)						✔
Nonconventional pollutants	Amenable cyanide						✔
	Ammonia as nitrogen						✔
	Chemical oxygen demand (COD)	✔					
	Fluoride						✔
	Nitrate/Nitrite	✔					
	Total petroleum hydrocarbons (TPH)	✔					
	Thiocyanate						✔
	Total Kjeldahl nitrogen (TKN)	✔				✔	
	Total organic carbon (TOC)	✔					
	Total phenols	✔			✔		
	Weak acid dissociable (WAD) cyanide						✔
Priority metals	Arsenic				✔		
	Cadmium						✔
	Chromium				✔		
	Copper				✔		
	Lead						✔

Table 11-4 (Continued)

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Priority metals (continued)	Mercury				✔		
	Selenium				✔		
	Silver				✔		
	Thallium						✔
	Zinc						✔
Nonconventional metals	Aluminum			✔			
	Boron			✔	✔		
	Iron			✔			
	Magnesium			✔			
	Manganese			✔			
	Titanium				✔		
Priority organic constituents	Benzo(a)anthracene				✔		
	Benzo(b)fluoranthene				✔		
	Benzo(k)fluoranthene				✔		
	Benzo(a)pyrene				✔		
	Chrysene				✔		
	2,4-Dimethylphenol				✔		
	Fluoranthene				✔		
	4-Nitrophenol						✔
	Phenanthrene		✔		✔		
	Phenol						✔
	Pyrene				✔		

Table 11-4 (Continued)

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Nonconventional organic constituents	n-Tetracosane				✔		
	n-Docosane		✔		✔		
	n-Eicosane		✔		✔		
	n-Hexadecane		✔		✔		
	n-Octadecane				✔		
	o-Cresol				✔		
	p-Cresol				✔		
	Pyridine						✔
	1,2,3,7,8-Pentachlorodibenzo-p-dioxin				✔		
	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin				✔		
	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin				✔		
	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin				✔		
	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin				✔		
	Octachlorodibenzo-p-dioxin				✔		
	2,3,7,8-Tetrachlorodibenzofuran						✔
	1,2,3,7,8-Pentachlorodibenzofuran				✔		
	2,3,4,7,8-Pentachlorodibenzofuran				✔		
	1,2,3,4,7,8-Hexachlorodibenzofuran				✔		
	1,2,3,6,7,8-Hexachlorodibenzofuran				✔		

Table 11-4 (Continued)

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Nonconventional organic constituents (continued)	1,2,3,7,8,9-Hexachlorodibenzofuran				✔		
	2,3,4,6,7,8-Hexachlorodibenzofuran				✔		
	1,2,3,4,6,7,8-Heptachlorodibenzofuran				✔		
	1,2,3,4,7,8,9-Heptachlorodibenzofuran				✔		
	Octachlorodibenzofuran				✔		
Other priority pollutant	Total cyanide						✔

Table 11-5

Pollutants Considered for Regulation for Direct Dischargers Ironmaking Subcategory - Blast Furnace Segment

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Conventional pollutants	Oil and grease (O&G)						✔
	Total suspended solids (TSS)						✔
Nonconventional pollutants	Amenable cyanide						✔
	Ammonia as nitrogen						✔
	Chemical oxygen demand (COD)	✔					
	Fluoride						✔
	Nitrate/Nitrite	✔				✔	
	Total petroleum hydrocarbons (TPH)	✔					
	Thiocyanate						✔
	Total Kjeldahl nitrogen (TKN)	✔					
	Total organic carbon (TOC)	✔			✔		
	Weak acid dissociable (WAD) cyanide						✔
Priority metals	Chromium				✔		
	Copper				✔		
	Lead						✔
	Nickel				✔		
	Selenium				✔		
	Zinc						✔

Table 11-5 (Continued)

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Nonconventional metals	Aluminum			✔			
	Boron			✔	✔		
	Iron			✔			
	Magnesium			✔	✔		
	Manganese			✔			
	Molybdenum						✔
	Titanium						✔
Nonconventional organic constituent	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin				✔		
Other priority pollutant	Total cyanide						✔

Table 11-6

Proposed Regulated Pollutants for the Integrated Steelmaking Subcategory

Pollutant	BAT	PSES	NSPS	PSNS
Lead	✔	✔	✔	✔
Zinc	✔	✔	✔	✔

Note: EPA is not proposing to revise BPT or BCT for this subcategory.

Table 11-7

Pollutants Considered for Regulation for Direct Dischargers
Integrated Steelmaking Subcategory

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Conventional pollutants	Oil and grease (O&G)						✔
	Total suspended solids (TSS)						✔
Nonconventional pollutants	Ammonia as nitrogen						✔
	Chemical oxygen demand (COD)	✔					
	Fluoride					✔	
	Nitrate/nitrite	✔					
	Total petroleum hydrocarbons (TPH)	✔					
	Total organic carbon (TOC)	✔					
Priority metals	Antimony						✔
	Beryllium				✔		
	Cadmium						✔
	Chromium						✔
	Copper						✔
	Lead						✔
	Mercury				✔		
	Nickel						✔
	Silver						✔
	Zinc						✔

Table 11-7 (Continued)

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Nonconventional metals	Aluminum			✔			
	Cobalt				✔		
	Iron			✔			
	Magnesium			✔			
	Manganese			✔			
	Molybdenum						✔
	Tin						✔
	Titanium						✔
	Vanadium						✔
Priority organic constituent	Phenol				✔		

Table 11-8

Proposed Regulated Pollutants for the Integrated and Stand-Alone Hot Forming Subcategory

Pollutant	BAT	NSPS
Carbon and Alloy Steel Segment		
Total suspended solids (TSS)		✔
Oil and grease (O&G)		✔
Lead	✔	✔
Zinc	✔	✔
Stainless Steel Segment		
Total suspended solids (TSS)		✔
Oil and grease (O&G)		✔
Chromium	✔	✔
Nickel	✔	✔

Note: EPA is not proposing to revise BPT, BCT, PSES, or PSNS for this subcategory.

Table 11-9

Pollutants Considered for Regulation for Direct Dischargers
Integrated and Stand-Alone Hot Forming Subcategory - Carbon and Alloy Steel Segment

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Conventional pollutants	Oil and grease (O&G)						✔
	Total suspended solids (TSS)						✔
Nonconventional pollutants	Ammonia as nitrogen						✔
	Chemical oxygen demand (COD)	✔					
	Fluoride						✔
	Total petroleum hydrocarbons (TPH)	✔					
Priority metals	Lead						✔
	Zinc						✔
Nonconventional metals	Iron			✔			
	Manganese			✔			
	Molybdenum						✔

Table 11-10

Pollutants Considered for Regulation for Direct Dischargers
Integrated and Stand-Alone Hot Forming Subcategory - Stainless Steel Segment

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Conventional pollutants	Oil and grease (O&G)						✔
	Total suspended solids (TSS)						✔
Nonconventional pollutants	Chemical oxygen demand (COD)	✔					
	Fluoride						✔
	Total petroleum hydrocarbons (TPH)	✔					
	Total organic carbon (TOC)	✔					
Priority metals	Antimony						✔
	Chromium						✔
	Copper				✔		
	Nickel						✔
	Zinc				✔		
Nonconventional metals	Iron			✔			
	Manganese			✔			
	Molybdenum						✔
	Titanium						✔

Table 11-11

Proposed Regulated Pollutants for the Non-Integrated Steelmaking and Hot Forming Subcategory

Pollutant	BAT	PSES
Carbon and Alloy Steel Segment		
Lead	✔	
Zinc	✔	
Stainless Steel Segment		
Chromium	✔	✔
Nickel	✔	✔

Note: EPA is proposing zero discharge of pollutants for NSPS and PSNS.
EPA is not proposing to revise PSES for the Carbon and Alloy Segment of this subcategory.
EPA is not proposing to revise BPT or BCT for this subcategory.

Table 11-12

Pollutants Considered for Regulation for Direct Dischargers
Non-Integrated Steelmaking and Hot Forming Subcategory - Carbon and Alloy Steel Segment

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Conventional pollutants	Oil and grease (O&G)						✔
	Total suspended solids (TSS)						✔
Nonconventional pollutants	Ammonia as nitrogen						✔
	Chemical oxygen demand (COD)	✔					
	Total petroleum hydrocarbons (TPH)	✔					
	Total organic carbon (TOC)	✔					
Priority metals	Lead						✔
	Zinc						✔
Nonconventional metals	Iron			✔			
	Manganese			✔			

Table 11-13

Pollutants Considered for Regulation for Direct Dischargers
Non-Integrated Steelmaking and Hot Forming Subcategory - Stainless Steel Segment

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Conventional pollutants	Oil and grease (O&G)						✔
	Total suspended solids (TSS)						✔
Nonconventional pollutants	Ammonia as nitrogen					✔	
	Chemical oxygen demand (COD)	✔					
	Fluoride						✔
	Nitrate/nitrite	✔					
	Total petroleum hydrocarbons (TPH)	✔					
	Total organic carbon (TOC)	✔					
Priority metals	Antimony					✔	
	Chromium						✔
	Copper				✔		
	Lead						✔
	Nickel						✔
	Zinc				✔		

Table 11-13 (Continued)

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Nonconventional metals	Aluminum			✔	✔		
	Boron			✔			
	Hexavalent chromium						✔
	Iron			✔			
	Manganese			✔			
	Molybdenum						✔
	Titanium						✔
Priority organic constituent	Tribromomethane		✔		✔		

Table 11-14

Proposed Regulated Pollutants for the Steel Finishing Subcategory

Pollutant	BAT	NSPS	PSNS
Carbon and Alloy Steel Segment			
Total suspended solids (TSS)		✔	
Oil and grease (O&G)		✔	
Chromium	✔	✔	✔
Hexavalent chromium	✔	✔	✔
Lead	✔	✔	✔
Zinc	✔	✔	✔
Stainless Steel Segment			
Total suspended solids (TSS)		✔	
Oil and grease (O&G)		✔	
Ammonia as nitrogen	✔	✔	✔
Fluoride	✔	✔	✔
Chromium	✔	✔	✔
Hexavalent chromium	✔	✔	✔
Nickel	✔	✔	✔

Note: EPA is not proposing to revise BPT, BCT, or PSES for this subcategory.

Table 11-15

Pollutants Considered for Regulation for Direct Dischargers Steel Finishing Subcategory - Carbon and Alloy Steel Segment

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Conventional pollutants	Oil and grease (O&G)						✔
	Total suspended solids (TSS)						✔
Nonconventional pollutants	Ammonia as nitrogen						✔
	Chemical oxygen demand (COD)	✔					
	Fluoride				✔		
	Nitrate/Nitrite	✔					
	Total petroleum hydrocarbons (TPH)	✔					
	Total organic carbon (TOC)	✔					
	Total phenols	✔			✔		
	Sulfate			✔			
Priority metals	Antimony				✔		
	Arsenic				✔		
	Chromium						✔
	Copper				✔		
	Lead				✔		✔*
	Nickel						✔
	Selenium				✔		
	Zinc						✔

Table 11-15 (Continued)

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Nonconventional metals	Aluminum			✔	✔		
	Boron			✔	✔		
	Hexavalent chromium						✔
	Iron			✔			
	Manganese			✔			
	Molybdenum				✔		
	Tin						✔
	Titanium				✔		
Priority organic constituents	Bis(2-ethylhexyl) phthalate				✔		
	1,1,1-Trichloroethane		✔		✔		
Nonconventional organic constituents	alpha-Terpineol				✔		
	Benzoic acid				✔		
	n,n-Dimethylformamide				✔		
	n-Dodecane		✔		✔		
	n-Eicosane						✔
	n-Hexadecane		✔				
	n-Octadecane				✔		
	n-Tetradecane		✔		✔		
	2-Propanone				✔		

Table 11-16

Pollutants Considered for Regulation for Direct Dischargers
Stainless Finishing Subcategory - Stainless Steel Segment

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Conventional pollutants	Oil and grease (O&G)						✔
	Total suspended solids (TSS)						✔
Nonconventional pollutants	Ammonia as nitrogen						✔
	Chemical oxygen demand (COD)	✔					
	Fluoride						✔
	Nitrate/nitrite	✔				✔	
	Total petroleum hydrocarbons (TPH)	✔					
	Total cyanide				✔		
	Total organic carbon (TOC)	✔					
	Total phenols	✔			✔		
Priority metals	Antimony				✔		
	Arsenic				✔		
	Cadmium				✔		
	Chromium						✔
	Copper						✔
	Lead				✔		
	Nickel						✔
	Selenium				✔		
	Zinc				✔		

Table 11-16 (Continued)

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Nonconventional metals	Aluminum			✔			
	Barium				✔		
	Boron			✔			
	Cobalt				✔		
	Hexavalent chromium						✔
	Iron			✔			
	Magnesium			✔			
	Manganese			✔			
	Molybdenum						✔
	Tin				✔		
	Titanium						✔
	Vanadium				✔		
Priority organic constituents	Naphthalene		✔		✔		
	Phenol				✔		
	Ethylbenzene		✔		✔		
	Toluene		✔		✔		
Nonconventional organic constituents	2,6-Di-tert-butyl-p-benzoquinone				✔		
	2-Methylnaphthalene		✔		✔		
	Benzoic acid				✔		
	Hexanoic acid		✔		✔		
	n-Docosane		✔		✔		
	n-Dodecane		✔		✔		
	n-Eicosane		✔		✔		

Table 11-16 (Continued)

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Nonconventional organic constituents (continued)	n-Hexadecane		✔		✔		
	n-Octadecane		✔		✔		
	n-Tetracosane				✔		
	n-Tetradecane		✔		✔		
	2-Propanone				✔		
	m-Xylene		✔		✔		
	o- + p-Xylene		✔		✔		

Table 11-17

Proposed Regulated Pollutants for the Other Operations Subcategory

Pollutant	BPT	BCT	NSPS
Direct Reduced Iron Segment			
Total suspended solids (TSS)	✔	✔	✔
Forging Segment			
Total suspended solids (TSS)	✔	✔	✔
Oil and grease (O&G)	✔	✔	✔

Note: EPA is proposing zero discharge of pollutants for the Briquetting Segment.
EPA is not proposing limits at BAT, PSES, or PSNS for this subcategory.

Table 11-18

Pollutants Considered for Regulation for Direct Dischargers
Other Operations Subcategory - Direct Reduced Ironmaking Segment

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively Treated	Considered for Regulation
Conventional pollutants	Oil and grease (O&G)						✔
	Total suspended solids (TSS)						✔
Nonconventional pollutants	Ammonia as nitrogen						✔
	Chemical oxygen demand (COD)	✔					
	Fluoride					✔	
	Total petroleum hydrocarbons (TPH)	✔					
Nonconventional metals	Aluminum			✔			
	Iron			✔			
	Manganese			✔			
	Titanium						✔

Table 11-19

POTW Percent Removals

Pollutant	Subcategory	Percent Removal	Source
Ammonia as nitrogen	A, B, F	39	50 POTW Study (10 × ML)
Benzo(a)pyrene	A	95	NRMRL (all wastewater)
Chromium	D, E, F	80	50 POTW Study (10 × ML)
Fluoride	F	54	NRMRL (all wastewater)
Hexavalent chromium	F	6	NRMRL (all wastewater)
Lead	B, C, D, E, F	77	50 POTW Study (10 × ML)
Mercury	A	90	50 POTW Study (10 × ML)
Naphthalene	A	95	50 POTW Study (10 × ML)
Nickel	D, E, F	51	50 POTW Study (10 × ML)
Phenol	A, B	95	50 POTW Study (10 × ML)
Selenium	A	34	NRMRL (domestic wastewater)
2,3,7,8-tetrachlorodibenzofuran (TCDF)	B	83	Transfer from 1,2,3,4,6,7,8-HPCDF (NRMRL)
Thiocyanate	A	70	Transfer from total cyanide
Total cyanide	A, B	70	50 POTW Study (10 × ML)
Zinc	B, C, D, E, F	79	50 POTW Study (10 × ML)

ML - Minimum level.
A - Cokemaking.
B - Ironmaking.
C - Integrated Steelmaking.
D - Integrated and Stand-Alone Hot Forming.
E - Non-Integrated Steelmaking and Hot Forming.
F - Steel Finishing.

Table 11-20

POTW Pass-Through Analysis Results for the Cokemaking Subcategory

Pollutant	BAT % Removal	POTW % Removal (Reference)	Henry's Law Constant (atm/gmole/m^3)	BAT% removal > POTW % Removal?	Henry's Law Constant > 1E-04 ?	Does Pollutant Pass Through?
Ammonia as nitrogen	>99.9%	39 % (A)	--[a]	Yes	--	Yes
Total cyanide	96 %	70 % (A)	--[a]	Yes	--	Yes
Thiocyanate	99.9 %	70 % (C)	--[a]	Yes	--	Yes
Mercury	83 %	90 % (A)	--[a]	No	--	No
Selenium	73 %	34 % (B)	--[a]	Yes	--	Yes
Benzo(a)pyrene	≥88 %	95 % (B)	4.9E-07[b]	No	No	No
Naphthalene	≥99.9 %	95 % (A)	--[a]	Yes	--	Yes
Phenol	≥99.9 %	95 % (A)	--[a]	Yes	--	Yes

[a]EPA did not perform a volatile override analysis for pollutants already determined to pass through based on BAT and POTW percent removal comparison and for nonvolatile pollutants.
[b]Source: U.S. EPA, Development Document for Proposed Effluent Limitations Guidelines and Standards for the Centralized Waste Treatment Industry, December 1998 (Reference 11-4).
(A) U.S. EPA's 50-POTW Study, with data-editing criteria such that only data pairs (influent and effluent) with influent ≥ 10 × ML were used.
(B) U.S. EPA's NRMRL Database.
(C) Transfer from another pollutant.

Table 11-21

POTW Pass-Through Analysis Results for the Ironmaking Subcategory

Pollutant	BAT % Removal	POTW % Removal (Reference)	Does Pollutant Pass Through?
Ammonia as nitrogen	99.8%	39 % (A)	Yes
Total cyanide	0 %	70 % (A)	No
Lead	99.8 %	77 % (A)	Yes
Zinc	99.8 %	79 % (A)	Yes
Phenol	≥90 %	95 % (A)	No
2,3,7,8-Tetrachlorodibenzofuran (TCDF)[a]	≥94 %	83 % (B)	Yes

[a]2,3,7,8-TCDF is regulated for the Sintering Segment of the Ironmaking Subcategory only.
(A) U.S. EPA's 50-POTW Study, with data-editing criteria such that only data pairs (influent and effluent) with influent ≥ 10 × ML were used.
(B) Transfer from another pollutant.

Table 11-22

POTW Pass-Through Analysis Results for the Integrated Steelmaking Subcategory

Pollutant	BAT % Removal	POTW % Removal (Reference)	Does Pollutant Pass Through?
Lead	99.8 %	77 % (A)	Yes
Zinc	>99.9 %	79 % (A)	Yes

(A) U.S. EPA's 50-POTW Study, with data-editing criteria such that only data pairs (influent and effluent) with influent $\geq$ 10 × ML were used.

Table 11-23

POTW Pass-Through Analysis Results for the Integrated and Stand Alone Hot Forming Subcategory

Pollutant	BAT % Removal	POTW % Removal (Reference)	Does Pollutant Pass Through?
Carbon and Alloy Steel Segment			
Lead[a]	18 %	77 % (A)	No
Zinc	70 %	79 % (A)	No
Stainless Steel Segment			
Chromium	97 %	80 % (A)	Yes
Nickel	96 %	51 % (A)	Yes

[a] No BAT data for this pollutant passed the influent $\geq$10 × ML criteria; therefore, paired data with influent concentration < 10 × ML were used to calculate percent removal.
(A) U.S. EPA's 50-POTW Study, with data-editing criteria such that only data pairs (influent and effluent) with influent $\geq$10 x ML were used.

Table 11-24

POTW Pass-Through Analysis Results for the Non-Integrated Steelmaking and Hot Forming Subcategory

Pollutant	BAT % Removal	POTW % Removal (Reference)	Does Pollutant Pass Through?
Carbon and Alloy Steel Segment			
Lead[a]	98 %	77 % (A)	Yes
Zinc	97 %	79 % (A)	Yes
Stainless Steel Segment			
Chromium	97 %	80 % (A)	Yes
Nickel	96 %	51 % (A)	Yes

[a] No BAT data for this pollutant passed the influent ≥10 × ML criteria; therefore, paired data (stainless) influent concentration and influent data (carbon) were < 10 × ML.
(A) U.S. EPA's 50-POTW Study, with data-editing criteria such that only data pairs (influent and effluent) with influent ≥10 x ML were used.

Table 11-25

POTW Pass-Through Analysis Results for the Steel Finishing Subcategory

Pollutant	BAT % Removal	POTW % Removal (Reference)	Does Pollutant Pass Through?
Carbon and Alloy Steel Segment			
Chromium	99.6 %	80 % (A)	Yes
Hexavalent chromium	98 %	6 % (B)	Yes
Lead[a]	74 %	77 % (A)	No
Zinc	99 %	79 % (A)	Yes
Stainless Steel Segment			
Ammonia as nitrogen	7 %	39 % (A)	No
Fluoride	81 %	54 % (B)	Yes
Chromium	99.9 %	80 % (A)	Yes
Hexavalent chromium	99 %	6 % (B)	Yes
Nickel	99.6 %	51 % (A)	Yes

[a] No BAT data for this pollutant passed the influent $\geq 10 \times$ ML criteria; therefore, paired data (carbon) influent concentration and influent data (stainless) < 10 x ML were used to calculate the percent removal.
(A) U.S. EPA's 50-POTW Study, with data-editing criteria such that only data pairs (influent and effluent) with influent $\geq 10 \times$ ML were used.
(B) U.S. EPA's NRMRL Database.